VOL. 4. NO. 8. AUGUST, 1906.



# THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD. THE BRASS FOUNDER AND FINISHER
AND ELECTRO-PLATERS REVIEW.

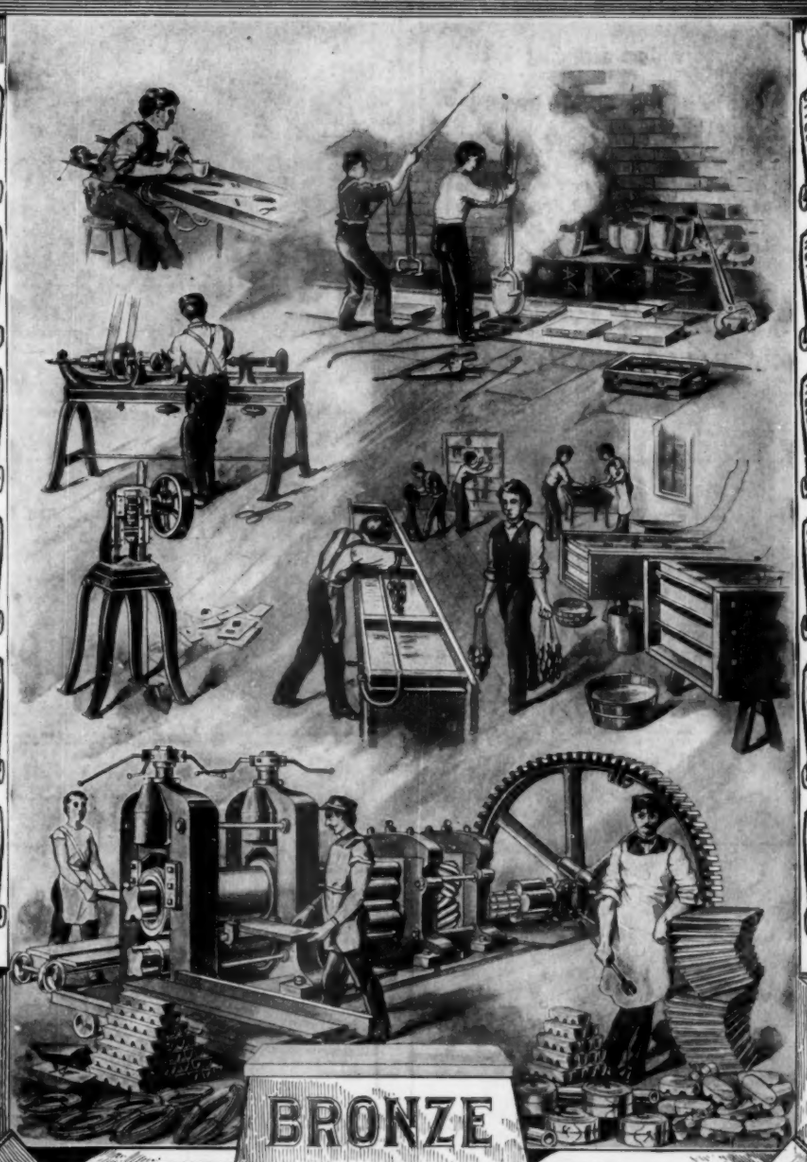
A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

ALUMINUM · COPPER · NICKEL · TIN · SILVER · LEAD · GOLD · ZINC

METALLOGRAPHY · BRASS · METALLURGY

ROLLING · DRAWING · STAMPING · SPINNING · PLATING · POLISHING

MELTING · REFINING · ALLOYING · CASTING · ROUNDING · FINISHING



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VOL. 12, NO. 8.

NEW YORK, AUGUST, 1906.

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THE METAL INDUSTRY
EMBRACING
THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
AND
ELECTRO PLATERS REVIEW

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CONTENTS.



## DUST FROM BUFF WHEELS.

A decision of interest to every manufacturer of metal goods has just been rendered by Justice Murphy, of Buffalo. Complaint was made by the authorities that the Geo. A. Ray Manufacturing Company had not complied with the law in the matter of providing fans for the removal of dust from their buffing rooms. The law states that exhaust fans shall be provided for the removal of dust from rooms having dust creating machinery. The defense maintained that the law made no mention of buffing wheels or buffing rooms and that it was enacted to cover emery grinders, emery polishing and grinding stones, but that it did not apply to buffing lathes. The company also contended that their buffing lathes did not create dust, but that they did create a certain amount of dirt which was too heavy to rise and be carried about by currents of air. This was because of the heavy and exceedingly greasy nature of the tripoli and on account of the large quantity of stearine used in the compound.

The company had several workmen examined by competent physicians as to expansion and contraction of the lungs, action of the heart and general physical conditions. Each and every man was pronounced to be in the best of health. The company did all in its power to have the matter sifted and to find out if the work had any injurious effect upon any of their employes, with the result that in no single case did the physicians find trouble that could be attributed to the presence of dirt in the buffing room, either floating or deposited.

The air in the room was analyzed by the State chemist, who found that air in the centre of the room contained only six-tenths of a grain of vegetable matter in about 700 cubic inches. Air taken from directly in front of a lathe at the height of a workman's head held eight-tenths of a grain of vegetable matter in the same number of inches. His conclusion was that the machinery was not dust creating and that the room contained no more dust than any ordinary factory.

Other manufacturers conducting similar establishments stated that they had experimented with fan systems in their buffing rooms and that they created fires, caused clogging of the pipes and finally had to be abandoned. This was also the experience of the Ray Company, who had a fan installed by the Buffalo Forge Company.

Independent of the harmlessness of the dirt, the Ray Company contended that there is at the present time no

known successful method of removing the dirt coming from the wheels, and, further, that they cannot conduct their business under the fan system. They have appealed the decision and have carried the case to a higher court.

### TEMPERING DIES.

A die for sheet metal work or forging may, when it is ready to be tempered, be worth from a few cents to hundreds of dollars according to the labor expended upon it. In the old way of hardening it was liable to be cracked and ruined in the tempering. No matter how skillful the temperer might be the losses he incurred were from 5 to 15 per cent. of the total amount of work passing through his hands and his department was, therefore, the most expensive in the whole establishment. But the forge fire and the tub of water in which was dissolved some secret composition known only to the presiding genius of the place are passing away.

In the most progressive establishments scientific methods have displaced the old. The heat is no longer guessed at by the color of the steel; a pyrometer insures heating to exactly the right degree. The coals are no more heaped around the article and placed over it and pushed under it; a special furnace is provided in which the heat can be regulated with precision. The hardening is done according to rule, not the rule of the thumb, and the final drawing is done in a bath of known temperature and one that will produce the result desired.

In the modern method the heat necessary to accomplish the object is determined beforehand and is controlled by the composition of the steel, principally the percentage of carbon, and the work for which the die is to be used. These points having been settled, the die passes through the tempering department and no one is worried about possible mistakes being made. All the operations are beautifully exact. That this is true is shown by the fact that it is now easy to duplicate or reproduce a die and to temper articles in quantity so accurately that there is not the slightest variation one from the other.

From the manufacturer's point of view the advantages are obvious. All his tempering work is determined in the office and the proper course is laid out there. The work enters the tempering room accompanied by certain instructions which do not require an expert for their execution. The appliances being at hand, the results are assured. Equally apparent are the benefits derived by the user of the die. It can be relied upon to do the work for which it was intended. There is thus a saving in both directions, in first cost and in increased output due to reliable material.

The question confronting every die sinker and one upon which he may profitably ponder is this: How far will my losses, in cracked dies and imperfect work, go toward paying the interest on a tempering plant built along modern lines? It is the old struggle between guesswork, that may succeed, and accuracy, that must succeed.

### THE GOOD WILL CREATED BY ADVERTISING.

I want to impress upon you the cumulative value of advertising. When they were trying to make Arbuckle give an inventory of his wealth on the witness stand a few years ago the old gentleman enumerated almost every asset he had except the cumulative value of his advertising, his manufactured good will. He has paid more than a million dollars out in advertising and he has created a more or less intangible property, worth more than his entire plant, great as it is. Why, some years ago an enterprising manager over there got out a new and much nicer-looking package than their old ones and sent out the goods in it. But the people wouldn't have it. Arbosa coffee had been put up in packages with two deformed yellow angels on a red background, and that trade-mark had been pounded into them for thirty years, and they wouldn't have anything else.

Suppose a new set of men in a new shop had the exclusive right to use the name of Brown & Sharpe, or Pratt & Whitney, or any other good concern that has been advertised for twenty-five years or more, and the old concern with its shops and equipment and men stood where they are, nameless and obliged to start afresh. Just imagine that condition. Which would be the greater asset? Why, you can buy the other things with money, but the good will and confidence and sales and assurance of good prices are business that comes to you without effort and go only with the investment in printer's ink and time for it to grow and spread. There is not a machinery manufacturer in America that is being and has been well advertised to his trade that the good will is not the largest asset he has; and there is not a manufacturer of machinery who never has and does not advertise, but who sells through dealers and jobbers exclusively, who has any other asset than an inventory of his shop will show. Shops and buildings and stock deteriorate with time. Good will, cumulative results, reputation and the pick of the business grow larger and larger, like the waves from a dropped pebble. Good will, reputation, the results of advertising, can be bought cheap and paid for on the instalment plan. It pays no taxes, requires little attention, is in itself an insurance.

Why don't men buy more of it? Because advertising is itself somewhat intangible; because you and your employers don't always know what is and what is not real advertising. You often charge up to advertising expenses what ought to be charged to something else. Because good will created by advertising grows up slowly, the buyer has charged its cost to expense, and, as the years go by, he gives himself credit for creating something out of nothing. He calls himself, to himself, a self-made man, acknowledges he is popular, etc., and forgets the seed he so carelessly threw to the four winds so long ago. Because this intangible something that is really so valuable is represented by no stock certificate or engraved bond—it's blue sky. It is a property that will decrease by neglect—aye, die of it, like lapsed life insurance—but properly kept up, there is no business investment so safe, reliable and secure.

And now, gentlemen, in closing, I want to express the hope that your association will study the subject of advertising, so that senior members of your class will always be in demand for the advertising department of all large manufacturers and the amateurs be relegated to the smaller jobs. May you do your work so well that your employers will look upon your department as just as essential as the power house and of his own volition order the bookkeeper to charge the entire cost of your department to investment, and not expense.—Abstract from address of John A. Hill, president of the Trade Press Association, at Publishers' Night of the Technical Publicity Association, New York, May 3, 1906.

[Another instance of the asset of advertising was recently cited in THE METAL INDUSTRY office when a representative of the Yale & Towne Manufacturing Company said that one of their competitors had inquired how the Yale & Towne people secured so much publicity. Wherever the competitor went to sell chain blocks he was always confronted with the question:

"How about the Yale and Towne block?"]

# METAL LOSSES IN THE ROLLING MILL.

By Andrew M. Fairlie.*

The logical products of the brass and copper rolling mill—sheet copper and sheet brass—to-day constitute only a fraction of the total output of our larger enterprises. The expanding concerns have enlarged the field of their activities in two main directions: first, in the manufacture of goods other than sheet, such as wire, rods, bars, brazed and seamless tubing, mouldings, etc.; and secondly, in the production of alloys other than brass—notably various bronzes and German silver.

As in the smelting of metals from their ores, so in the manufacture of metallic goods, metal losses are unavoidable. And the consumer as well as the producer of raw metals must exercise untiring vigilance to keep these losses low. At the smelting works the number of metallurgical operations is usually few, and chemical analysis of tailings, slags, slimes, residues or flue dust will indicate the proportions of values lost. On the other hand, at the modern rolling mill metal is used in many different departments, and in such a variety of ways that the recovery of losses is no easy task, and losses sometimes occur in a mysterious way baffling to the pursuer. In this article some of the more important departments will be considered in turn, and some loopholes for the escape of metal will be pointed out, and methods of preventing and recovering losses indicated.

## LOSSES IN THE STOCK ROOM.

Losses in the stock room should be impossible. They can be prevented by a rigid system of weighing and accounting, as checks on the shippers and the users of metal. The purpose of each draught of metal from the stock room is recorded with the weight, to prevent the use of high grade spelter in the manufacture of cheap brass, or *vice versa*.

## THE CASTING SHOP.

The casting shop is the scene of the heaviest losses of metal. Experiments have shown that from 15 to 30 per cent. of all zinc melted in the manufacture of alloys is lost by volatilization and oxidation. No attempt is made to recover the zinc vapor, and in many shops the full extent of the loss is not realized. Although it seems impracticable to recover the zinc fumes, good practice demands that the percentage of zinc lost be determined and allowed for in calculating mixtures. Failure to do this will prove expensive for the brass maker, for he will make an alloy richer in copper than he is getting paid for, and the result will be equivalent to losing brass at 20 cents or more a pound, instead of spelter at 6 cents.

Suppose, for example, it is desired to make an alloy of 80 per cent. copper and 20 per cent. zinc, and the proportions weighed out are 80 pounds of copper to 20 pounds of spelter. If 20 per cent., or one-fifth, of the spelter is volatilized, then, neglecting minor losses, we have in the alloy, for every hundred pounds weighed out, 80 pounds of copper and 16 pounds of zinc; total, 96 pounds. Calculated to percentage, the alloy consists of copper, 83.33 per cent.; spelter, 16.67 per cent. That is, every hundred pounds of the alloy contains 3⅓ pounds of copper, which not only might, but ought to have been replaced by zinc. In other words, four pounds of spelter was volatilized, and the deficiency in weight was made good by four pounds of the brass, containing three and one-third pounds of copper. If now 25 pounds of spelter had been added instead of 20, the vaporization of one-fifth would have made an alloy of the desired proportions, with an ultimate saving in cost of materials.

One of the elusive losses of the casting shop is due to inaccurate scales. The scales must be good ones, kept in order, kept clean, and the weighing must be carefully and intelligently done, or inaccurate mixtures will result, leading to financial loss, or complaints from purchasers, or both.

Other losses of the casting shop are: metal spilled in furnace ashes; metal skimmed from crucibles, and metal lost from broken crucibles. It is customary to grind ashes and skimmings, and by means of hand picking, washing machines and jigs, to recover as much of the metal as possible by these means. These methods of treating foundry refuse have been described by Mr. W. M. Corse in The Metal Industry of March, 1906. Where the quantity of refuse is large, the practicability of introducing modern concentrating machinery should be considered. Concentrating tables, like the Wilfley, used extensively in the Lake Superior copper district for concentrating the native-copper ores, would seem to be admirably adapted for recovering fine particles of brass from crushed ashes or skimmings. To prevent loss of metal from broken crucibles, the best crucibles obtainable are used, and these are carefully annealed at about 300° F. to expel all moisture before using for the first heat. The use of tilting crucible furnaces is advisable, as the crucible is thus spared the wear produced by tongs, and a much longer life results.

## LOSSES IN THE MILLS.

In the tube mills the principal waste material is scrap, but metal also escapes as dross from the brazing furnaces, and as sawdust. The wire mill contributes more scrap and sawdust, and also scrapings from the dies. The rod mill furnishes scrap, and metal is lost in all the annealing furnaces in the form of oxide, or "copper scale." The brass rolling mill furnishes more scrap, and the pickling tanks consume a quantity of metal which has never been calculated.

Brass scrap is easily recovered by re-melting with new brass, and pieces too large for a crucible are chopped, and compressed into little bales of suitable size for a crucible by the hydraulic cabbaging press. The inevitable volatilization of zinc in melting scrap brass should be noted, and the loss compensated for by the addition of spelter. Scrap metal of different compositions should never be mixed indiscriminately. It is impossible to make an alloy of known composition by remelting unknown scrap. Sawdust and other fine particles of metal found in sweepings may be concentrated, and remelted with scrap metal in crucibles. All copper scale should be saved for reduction to metallic copper in the cupola. Metallic iron will precipitate copper from sulphuric acid solution (blue liquor from the pickling tanks) as a red mud, which is collected, dried, and charged into the cupola.

In the copper rolling mill the chief items of refuse are trimmings from sheet copper and oxide from heated cakes and sheets. The trimmings find their way to the refinery, to be remelted and cast into cakes, ingots, or wire bars.

The tinning department furnishes dross from the tinning bath, and trimmings from tinned copper sheet. At the present price of tin, the former is an important item. Tin can be recovered from the dross by melting down in crucibles with suitable proportions of cheap flour and carbonate of soda. The tinned scrap should be kept separate from the pure copper scrap. If bronze

*Chemist Tennessee Copper Company, Copper Hill, Polk County, Tenn.

is made in the casting shop, the tinned scrap could be used in the manufacture of this alloy, thus utilizing the tin coating.

THE COPPER REFINERY.

The copper refinery is a reverberatory furnace, lined with fire brick, and is used for remelting scrap copper and refining the black copper produced by the cupola. The molten metal is thoroughly oxidized by "rabbling," and is then reduced again by plunging poles of green wood into the bath. The process of rabbling produces a slag or scoria consisting of impurities in the metal, oxide of copper, and combinations of copper with the fire-brick lining. This scoria will contain from 50 to 75 per cent. copper, and this metal is recovered by smelting in a cupola furnace.

The scoria, with from time to time such copper oxide or cement copper as may come from the mills, is smelted in the cupola with suitable charges of limestone and iron oxide. For fuel, anthracite coal produces the cleanest slags, but retards the operation of the furnace. A mixture of coke and anthracite coal, in the ratio of 4:5 permits rapid running of the furnace and produces a slag carrying from 1 to 1.2 per cent. copper.

Other sources of loss will at once occur to those familiar with the copper and brass rolling mill. Metal is irrevocably lost in flue dust from chimneys and in tailings from the wash room; it is tracked away in tiny fragments on the soles of many feet; it passes out through the gates in the pockets and dinner pails of undesirable workmen. In a general way, it is realized that the losses are large, and there is room for improvement in the methods of preventing losses and recovering values in all departments. As loss-preventative, much can be done by insistently keeping waste and scrap down to the minimum, and by keeping separate the different kinds of scrap. To recover the losses, the rule is constant, intelligent watchfulness and attention to details, combined with metallurgical knowledge and chemical skill.

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## LEAD AND ZINC IN BELGIUM AND OTHER COUNTRIES.

Consul McNally, of Liege, reports that the importation of zinc and lead bearing minerals into Belgium in 1905, with the country of origin, was, in tons, as follows: Sardinia, 94,364; Spain, 51,537; Italy, 2,332; France, 51,870; Algeria and Tunis, 58,571; Sweden and Norway, 34,896; England, 12,080; America, 14,094; Greece, 14,285; Australia, 100,065; Chile, 50; Japan, 6,396; divers, 61,430, making a total of 501,970 tons. Of that total 149,390 tons were consumed by the Vieille-Montagne Company, of Liege.

The average price of brut zinc in 1905 was $123.46 per English ton, which was an increase of $13.54 over that of 1904. This increase was wholly due to the favorable condition of the market. While the production of brut zinc for 1905 was greater than that of the previous year, the demands exceeded the production. England has increased her exports of galvanized sheets, which manufacture has absorbed great quantities of zinc, besides the Russian and Japanese governments ordered a considerable excess in 1905 over that of 1904 of pure zinc for use in the manufacture of cartridge shells.

The average price of lead (English) in 1905 was $65.11 for a ton of 2,240 pounds, which is an increase of $8.46 over 1904. The production of spelter in Belgium for 1905 was 143,165 tons, of which the Vieille-Montagne Company, of Liege, contributed 62,905. The production in 1904 was 137,780 tons, the Vieille-Montagne Company's share being 58,575 tons. The production of other countries in 1905, compared with 1904, was as follows: Holland, 13,550 tons against 12,895; Great Britain, 50,125 tons against 45,490; the Rhine district, 66,185 tons against 64,360; France and Spain, 49,575 against 48,310; Silesia, 127,895 tons against 123,695; Austria and Italy, 9,210 tons against 9,100; Poland, 7,520 tons against 10,440 tons.

The production of the above countries aggregates 467,225 tons, while that of the United States was 180,360 tons for the same year, 1905. The imports of spelter into England in 1905 was 90,808 tons, against 88,669 in 1904. The total production in the above mentioned countries of Europe in 1896 was 344,355 tons, and that of the United States 73,105 tons. The total production of the Vieille-Montagne Company, of Liege, in its works in Belgium, Germany and France was, in 1905, 87,620 tons, against 83,580 in 1904.

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## JAPAN'S PROPOSED TARIFF AND IMPORTS OF METALS AND MACHINERY.

According to the United States consular reports there are under the subject of metals a number of increases in the proposed new tariff of Japan. The raise in block and ingot copper is from 5 to 7½ per cent and a general increase in all manufactured copper. Lead ingot raised from .316 sen to .38 sen per 100 kin. The lead imports from the United States in 1904 was $209,000 gold. Mercury raised to 7.20 yen per 100 kin. Mercury imports from the United States in 1904 was $90,250 gold. Zinc raised from 40 sen per 100 kin to 72 sen per 100 kin. Machinery for metal working raised from 10 to 15 per cent ad valorem. It is proposed to increase the tariff on watches from 30 per cent present rates to 50 per cent ad valorem. Cheap metal jewelry raised from 10 to 60 per cent ad valorem. Much of this class of merchandise heretofore came from the United States.

The imports of machinery at Kobe amounted in 1905 to $5,148,000, or over three times the value imported in 1904. Of all machines, lathes made the highest increase, amounting to $1,240,000. Next follow machines for metal and woodwork, spinning, and electric light plant, locomotives and electric motors. Each of these various lines showed an increase of over $250,000 on the figures for 1904. Imports continue to increase and the value of machinery imported during January last amounted to $515,800 against $330,600 for January last year. Almost every steamer arriving in Kobe from Europe has had consignments of machinery on board.

Protection is the watchword of the Japanese, and in every line of commerce and industrial expansion the dominant idea of the government and the people is to assist in every practical way the development of infant industries and the protection of the old ones. While Japan is admitting free the raw material in many cases, her scientists are daily experimenting with a view to produce this raw material. The fields of experimentation will be Korea and the leased territory of Manchuria, with such parts of China as are accessible. If these new fields can be made to produce, Japan with her superior merchant marine and other facilities will see to it that she offers the best market for the raw material. Japan has well defined plans in this respect, and hopes by their solution not only to make herself independent but to control the commercial industries of Asia.

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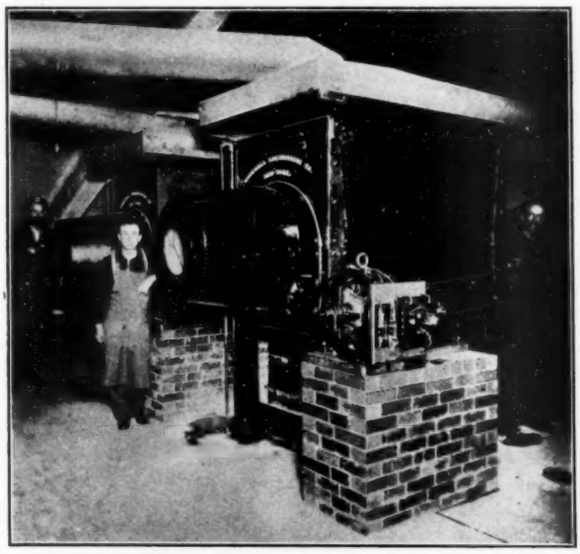
The brass catches and clasps used on toy bracelets and necklaces have been decided to be subject to a duty of 45 per cent. as manufactures of metal. They have been taxed as jewelry at 60 per cent.

## THE FUEL OIL EQUIPMENT AT THE U. S. MINT, DENVER, COLO.

The fuel oil equipment at the United States Mint, Denver, Colo., as installed by the Rockwell Engineering Company, of New York, consists of the following:

1 duplex fuel oil pumping system.
2 Planchette furnaces.
3 strip annealing furnaces.
3 gold boiling furnaces.



PLANCHETTE ANNEALING FURNACE.

1 sweep reducing furnace.
12 melting furnaces for No. 80 crucible.
3 melting furnaces for No. 14 to No. 30 crucible.
3 tempering and annealing tool furnaces.
1 No. 3, 1 No. 4 and 1 No. 5 steel pressure fan blowers.
1 7½, 1 10 and 1 15 horse power motors.

The two 8x28 feet fuel oil storage tanks, of a capacity of 12,500 gallons, were installed by the government.

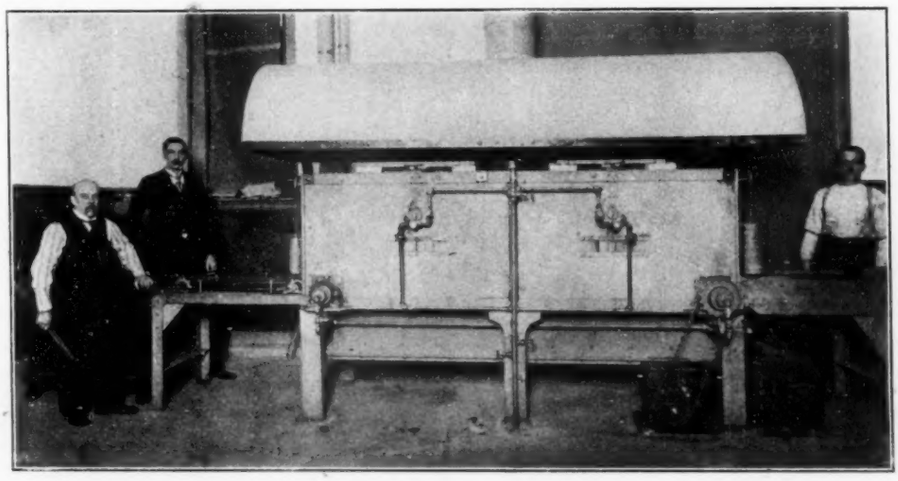
### The Planchette Annealing Furnace.

This furnace is used for annealing all the gold and silver blanks before they are stamped. It contains a hollow cylinder having a worm within it, the bottom of which is nearly concave. Bolted to this cylinder are two iron neck pieces which protrude through the brick work and run on trunnions on the outside of the furnace. A hopper is attached to one of these necks. Into the hopper the blanks are dumped, picked up by the pockets and then passed into the cylinder. Passing through the cylinder they drop out and down through a spout into the pickel tub. The pockets in the hopper pick up and dump the blanks into the worm twice per revolution. On the opposite end of the furnace from the hopper is a worm and gear which is run by a 1 horse power motor with gear box attachment having four changes of speed, so that the time of the passage of a blank through the furnace may range from 3½ to 11 minutes. There is but one Rockwell high pressure oil burner to each furnace, steam being used as the atomizing agent.

Combustion takes place in a brick chamber at the top of the furnace. The heat passes down through a perforated arch and around the cylinder. By this arrangement the blanks are heated by radiation and do not come into direct contact with the flame. The oil consumption is from 2½ to 3 gallons per hour.

### Strip Annealing Furnace.

This furnace is used for annealing gold and silver strips during the process of breaking down and before the blanks are punched. It has a conveyor chain passing through the main chamber and around a water cooled shaft at each end. The chain passes down into an inclosed chamber so that there is no cooling of the chain while the furnace is in operation. Tables at the ends of the furnace have conveyor chains for feeding the strips into the furnace and taking them out. These chains are run by sprocket chains connected with the water cooled shafts. The main shaft is at the exit end of the furnace and is connected by sprocket chain to a 1 horse power motor and gear box attachment, which has four changes of speed so that the time of passage of a strip through the furnace may vary from 2 to 5½ minutes. The table at the exit end contains a trough of water through which the strips pass when leaving the furnace. There are two high pressure oil burners to each furnace, steam being used as the atomizing agent. The process of combustion is the same as in that of the

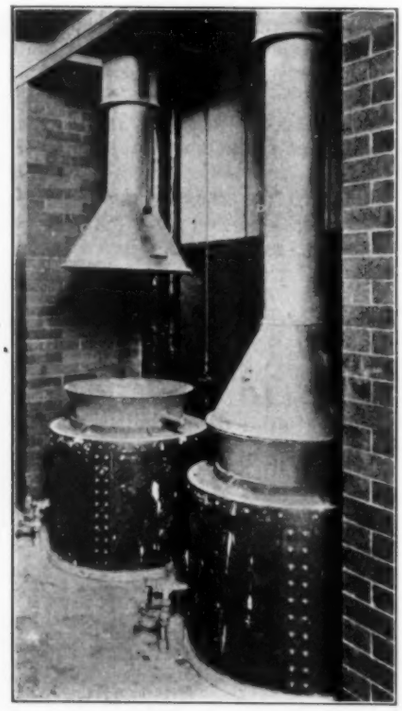


STRIP ANNEALING FURNACE.

furnace just described, and the consumption of oil is about the same.

GOLD BOILING FURNACE.

This is a small pot furnace in which the gold is boiled



GOLD BOILING FURNACE.

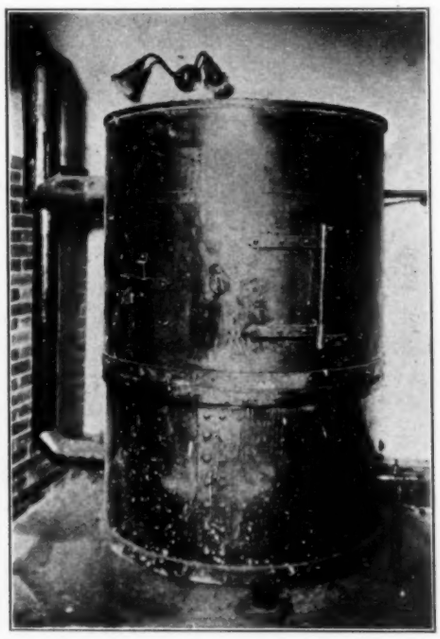
in acid. Compressed air is used as the atomizing agent, and the heat is generated beneath the pot. The consumption of oil is about 2½ gallons per hour.

SWEEP REDUCING FURNACE.

This furnace is employed to reduce the old rags, waste, gloves, sweepings, etc., in order to save the small particles of metallic dust. This is also a pot furnace and is provided with a double sheet iron fully inclosed hood. The smoke and fumes from the smoldering contents are retained within this hood and pass from it through iron flues to the main stack. Compressed air is used to atomize the oil, the consumption of which is about 2 gallons per hour.

MELTING FURNACES.

In these furnaces the oil is atomized with air at from 11 to 16 ounces pressure, the volume of air supplied by the blowers being from 600 to 750 cubic feet per minute. The combustion takes place in a small chamber at one side of the crucible and not against the crucible.



SWEEP REDUCING FURNACE.

CRUCIBLE MELTING FURNACE IN INGOT MELTING ROOM.

The furnaces used in the ingot room and refinery have cast iron tops with sliding doors, the tops being lined with tiles which are not subjected to the heat of the

melting chamber and seldom have to be replaced. The furnaces in the deposit melting room have a tile top with a hole in the center a little larger than the crucible. An ordinary crucible cover is used to cover this opening. In this style of furnace the pots are drawn and poured for each melt made, while in the other furnaces the contents of the pots are dipped out. The fuel oil consumption per furnace varies from 4 to 5½ gallons per hour.

### Tempering and Annealing Furnaces.

These are used for hardening, tempering, casehardening and annealing tools, taps, dies, etc. Combustion is beneath the chamber, compressed air being used to atomize the oil. One high pressure burner is attached to each furnace. Oil consumption varies from 2 to 3 gallons per hour. The three furnaces have chambers 9x13 inches, 13x13 inches and 18x24 inches.

### Oil Storage Tanks.

The two fuel oil storage tanks are located in the subbasement of the building. The oil is pumped from these tanks and forced through the oil lines throughout the building at a uniform pressure. The lines vary in size from ½ to 1¼ inches. The compressed air lines and steam lines vary accordingly. The low pressure or fan blast air lines range from 2½ to 4 inches, and from 6 to 10 inches. A 2½ inch vent pipe runs from the tanks to outside the roof of the building, and a 3-inch filling line runs from the tank to the street curb. All the piping is carried overhead and along side walls in the building, the branches to the burners passing through the floor beneath the furnaces from the room below.

CRUCIBLE MELTING FURNACES IN DEPOSIT MELTING ROOM.

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The exports of gold from the San Juan del Norte district of Nicaragua in 1905 amounted to $403,866, somewhat less than during the previous year. Consul Ryder reports that this is accounted for by the fact that two of the largest producing mines were worked only part of the year owing to improvements being made and new machinery installed.

### TIN IN BOLIVIA.

The British consul in the Oruro district of Bolivia reports that great progress is being made there in the development of tin mining. The older enterprises have been supplying themselves with new machinery, while new and promising mines are being opened up, though the scarcity of capital hinders their rapid development.

The most productive tin lodes outcrop at considerable elevations above neighboring water courses.

One of the great difficulties of mining on the Bolivian table-lands is the want of cheap motive power. Permanent water power is not available to any extent, coal is too expensive, and the native fuels are getting scarce. A solution appears to have been found to some extent in the employment of anthracite gas engines. Work is carried on at an elevation of from 12,000 to 14,000 feet, and the gas engines at Oruro give only about 70 per cent. efficiency, using about 1.5 pounds of anthracite per horsepower hour. The machinery of most interest at present is the various classes of gas producers and engines; machines for the separation of ores, such as tin, pyrites; blende and galena; rock boring machines; electric machinery for power transmission and lighting; electric mine hoists, and ore concentrating machines.

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### TIN PRODUCTION.

During the past five years the production of tin has increased only very slightly, while the price has advanced many fold. In 1880 the world produced 38,000 tons of the metal, and 1890, 55,000 tons. In 1900 the production was more than 80,000 tons and for the past five years the average has been more than 90,000 tons. At the present time 50 per cent. of the total output comes from the Malay States, 17 per cent. from Bolivia, 15 per cent. from the Dutch East Indies, 6 per cent. from Australia, 5 per cent. from Wales and 7 per cent. from other countries.

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During 1905 the gold production of New South Wales was 274,267 ounces, valued at £1,165,013.

# COMPOSITION AND MANAGEMENT OF SILVER BATHS.

By Edward E. Newton.

While silver plating solutions are simple to manage, difficulties sometimes arise on account of variations in their composition, produced by long usage. With proper care a silver solution can, however, be run for several years. I know of a solution that has been run for 14 years and is still doing good work. Some platers claim that it is not good policy to use a solution as old as this one, but I believe it is. With proper filtering, and care being exercised when making additions of silver and cyanide, a solution can be used indefinitely. The foreign matter can be eliminated in various ways.

### PREPARATION OF SOLUTIONS.

The best and most practical solution is the so-called double cyanide. In making this the plater should be careful to avoid an excess of cyanide; one part of silver cyanide to two parts of potassium cyanide is about the proper ratio. It is necessary to prevent the bath from becoming too alkaline from usage. It may contain an excess of potassium carbonate which in time is produced by the decomposition of the potassium cyanide. It is possible to remedy this in several ways; one is by using hydrocyanic acid about ¼ oz. to every gallon of solution. Great care must be observed in handling this acid as it is a most deadly poison. Another method and one probably safer and better is to add, from time to time, a small quantity of new cyanide of potassium, and also a little potassium in powdered form. The latter does not decompose the cyanide as rapidly as the acid does.

To prepare the cyanide of silver take pure crystalized nitrate of silver and dissolve it in water; then add potassium cyanide in solution till no more precipitate forms. Avoid an excess of cyanide which would redissolve a portion of the silver precipitate. The precipitated cyanide of silver is then filtered, washed and redissolved with potassium cyanide. This solution is far superior to the old style chloride of silver, since it produces a heavier and better deposit in less time. Although more costly and requiring more time to make, the results will pay in the long run.

Another solution used on cheap work is the "bright silver." It is not advisable to attempt to use this on good work as the deposit is hard and the color disagreeable. Work done in this solution is usually buffed after plating. The composition is as follows: Commence with the regular plating solution. Take the quantity needed and put in a separate vessel. Then take about a quart of the solution and add ¼ oz. of bisulphide of carbon; shake well and allow it to stand a few hours when a black sediment will form. After filtering, add about 1 oz. of this to every gallon of the regular plating solution. It is not advisable to add this to a regular plating bath for the reasons above stated. I have seen platers throw the bisulphide of carbon directly into the solution; this is wrong as it does not mix well and a black, dirty sediment will form in the bottom of the tank.

### DIP SILVERING.

The following gives probably the best results although the coating is very light: Dissolve ¼ lb. of cyanide of potassium in 1 qrt. of water, and also ½ lb. caustic potash in 1 qrt. of water. After mixing the two solutions add ½ oz. chloride of silver. Stir well and when all the silver has been dissolved the solution is ready for use. The work should be thoroughly cleaned and immersed in the solution used hot.

### USE OF LITMUS PAPERS.

Litmus test papers are very useful in the early stages of the operation. For instance, when making chloride of silver and the metal has been reduced and precipitated in chloride form, all the acid must be washed out with hot water. After several washings take a piece of blue litmus paper and dip it in the last water; if it turns red the chloride needs more washing as acid still remains. When the paper remains blue you know that the chloride is free from acid, or in other words, is neutral. The same procedure is of advantage in using the red paper in testing for alkali.

Litmus paper can be made very easily as follows: Take litmus and steep it in water until a dark blue solution is produced. Strips of unsized paper are dipped in the solution and then dried. To make the red litmus add enough muriatic acid to the blue solution to turn it red and then dip in strips of paper.

### THE HYDROMETER IN THE PLATING ROOM.

The hydrometer is one of the most useful instruments in the plating room. Its great value lies in its indicating the strength of the solution. It is useful both in making solutions and during the progress of working them. Before using the instrument it is well to test it in water. If it stands at zero it is correct. Sometimes the scale inside the glass shifts, and without testing, incorrect readings will result. When at its best a silver solution will stand at from 15 to 20 Baume; at this figure it will contain about 3 oz. of silver per gallon. I saw a solution where the hydrometer stood at 40° and it contained almost 10 oz. of silver to the gallon. About 150 to 200 gallons of the solution was removed from the tank and an equal amount of water added, when it never worked better.

### TESTING THE SOLUTION FOR SILVER.

A simple and rapid method of ascertaining the proper ratio between the silver and the cyanide is as follows: Take about ½ pint of solution in a glass; then dissolve ⅓ oz. nitrate of silver in 3 oz. of distilled water; this solution is dropped into the former drop by drop. If the white precipitate produced is rapidly dissolved by stirring, then the solution is too rich in cyanide or too poor in silver. Should the precipitate remain undissolved after long stirring the solution is too rich in silver and too poor in cyanide. When the precipitate is dissolved but slowly the solution is in the best condition.

Another method of determining the amount of silver in the solution is this: Take 1 pint actual measurement from the bath and add sulphuric acid a little at a time until no more precipitate forms. When it is all "thrown down" wash thoroughly and dry. It is well to fuse the chloride to make sure all the moisture has been driven out, then weigh on accurate scales. The weight multiplied by 8 will give the amount of silver per gallon in the solution.

### SILVER ANODES.

It is a mistake to allow foreign matter to accumulate on the anodes. In fact as far as black anodes are concerned no plater should tolerate them at all. The old idea was that when the anode turned black there was something wrong with the solution. Such is not the case, for, with several anodes in the same bath, some may turn black while others will remain undiscolored. Manufacturers to-day will guarantee anodes not to turn black.

It is very injurious to the work and is also the means of making the solution very dirty to have particles of black slime floating through it. It is a good plan to filter the solution every few months in order to remove all dirt and insect life which is sure to get into a large tank. This can be done through canvas or two or three thickness of canton flannel. Another good plan is to keep the work in motion during the time it is in the bath.

RHEOSTAT, CURRENT STRENGTH AND WIRING.

The rheostat is a necessary adjunct to the dynamo and should be used to regulate the voltage and prevent the burning of the work. They should be placed as near the tank as possible and in the line leading to the cathode rod. When used in the field the voltage is regulated throughout the entire line of connections.

Every plating room should have an ammeter as well as voltmeter. The latter is used to show if the power is steady, while the ammeter will control the amount of deposit. Therefore with proper manipulation there need be no guess work concerning the amount of metal deposited on a known surface in a given time. Different solutions require different amperes per square foot of surface as follows: Silver, 2; gold, 1½; cyanide copper, 6 to 8; acid copper, 10 to 12; brass, 6 to 8.

STORAGE BATTERIES.

In certain classes of work the storage battery is very useful, especially in glass deposit work where the work has to remain in the solution a great many hours, or over night. The battery is charged from the dynamo and when the day's work is done the wires are disconnected from the dynamo and the battery put in the circuit in its place.

## FRENCH BRONZING.

By Charles H. Proctor.

It has been rightly said that knowledge is power and in every walk of life this adage becomes more true when the person to whom it applies lacks the knowledge to conceive and work out its power to the best advantage. And so it may be justly applied to the worker in metals, the founder, the finisher and the plater. The polisher who understands the mode and methods of plating his work; the plater who understands every detail necessary to produce a surface before and after plating, enabling him to produce a finished product by his skill, has more knowledge than the polisher or plater who understands only his particular branch of the business. But how much more power has the plater or polisher who not only understands thoroughly these two allied branches but also the mode of lacquering and the art of decoration in bronze and color so much in demand at the present time.

There is no doubt that many young polishers and platers who are endeavoring to follow in the footsteps of their predecessors have oftentimes when visiting the city gazed admiringly into the windows of the art or department stores upon the French bronzes, statuary and objects of art that result from the united efforts of the founder, polisher, plater and bronzer, and the artistic results produced by this coterie, but like all other advanced branches of skill it is possible for the plater if he has any artistic taste to accomplish what others have done. To produce a polished surface or an electro deposit of brass, bronze or copper is only one essential part of French bronzing—to be able to decorate in bronze and color is the other. But this can be accomplished with a little study. It is only necessary to know what to use and how to use it.

In the United States there is only one firm that the writer is aware of who handles the right varnish, the finely divided composition, colors and bronzes necessary to produce these artistic effects. There have been many attempts by American varnish manufacturers to produce what is known as "French Vernis Mixtion." This is the name of the imported varnish used for binding the colors to the metallic surface. The colors are known as "Sangumes" of the various shades. Composition of numerous tints and very finely divided bronze powders known as French rich and pale gold are used in the production of Barbidenne, Florentine, Old Green Gold, Syrian Clay, Yellow Antique and many other bronze finishes. The varnish mixture drying more slowly than lacquer enables the bronzer to apply the colors dry or slightly moistened with refined turpentine and oil of lavender.

The colors being so fine in composition it is possible when dry to polish them with a soft brush and beeswax or flannel to a metallic lustre in reality a metal itself. So fine are the textures of these compositions, various tones and shades upon the high lights and crevices may be

STATUE FINISHED IN FRENCH BRONZE.

produced by deftly combining and applying compositions suitable to produce combination effects in color. The work enables the plater and finisher to apply all of his artistic taste to the decoration of this fascinating work and gives him pleasure and satisfaction as well as knowledge and power in his chosen art.

## FREDERICK STITT WARD.

A member of the plating supply business who will be missed by the plating industry is Frederick Stitt Ward, who died from Bright's disease July 13 at his home, 342 Roseville avenue, Newark, N. J., at the age of 54. In 1877 Mr. Ward entered the employ of the Condit, Hanson & Van Winkle Company, afterward incorporated as the Hanson & Van Winkle Company, and at the time of incorporation in 1891 he was made secretary, and in 1893 elected treasurer, which office he held at the time of his death. He was one of the first to become identified in the manufacture of electro-plating supplies and dynamos, and was very generally known and as generally well liked among the plating fraternity. His early death is attributed to overwork more than for any other cause.

## WATER METER MIXTURES.

The selection of the mixtures best adapted for the manufacture of water meters is not so easy as it would appear to be to one not familiar with the requirements. The controlling features, while simple in themselves, are very likely to produce trouble before an alloy is obtained that is acceptable in every way.

Discussing this question recently with the practical head of one of the most prominent manufacturing concerns in the meter business, several points were brought out that will serve to show the extreme care that must be exercised in the mixing room and in the foundry if all is to come out satisfactorily.

The problems to be solved were very different from those encountered in some manufacturing lines and were marked by extreme simplicity. But two essentials were imperatively demanded, namely, durability and adaptability to the requirements of the workroom. There were no electrical standards to be met and corrosion could be provided for in one bronze as in another. At first, when they were young in the meter industry and their knowledge of bronzes was not of commanding proportions, their troubles were constant and aggravating. They early discovered that if they were to continue the business at a profit, they must produce a mixture that would behave well under the tool. In other words, it must lend itself readily to the various machine operations through which it had to pass. This was the first and great difficulty; a refractory metal, that was hard to cut, increased the cost of manufacturing to such an extent that its employment was out of the question. Too soft a metal, on the other hand, worked well in the machines but would not stand up under every service, and, therefore, was as unsuitable as the first.

One other thing had to be learned in that costly school —experience—and that is that small and apparently insignificant changes in the formula produced great changes in the results. They had to learn the effect of one metal upon the other and its influence upon the alloy formed. Fortunately, they very early discarded guesswork and approximations, and placed their foundry under strict control. They were progressive enough to depend upon the chemist and insisted upon the analysis of every metal that went to make up the mixture, if there was the slightest doubt as to its puriy. Frequent analyses were also made of the castings, and by watching the foundry and the results the endeavor was made to maintain the standard.

But the best safeguard was in neither the chemist nor the foundry; when things ran along for months without complaint both were apt to become a little negligent. and to lessen their vigilance. It was found that one of the best and surest indications of a change in the nature of the metal came from the men who had to machine the castings. They were quick to notice alterations and were not backward about entering complaints; the metal was too hard or too soft; it clung to the tool or would not cut freely. An examination almost always proved the men to be right and a general overhauling brought conditions back to the normal.

An examination of one of the first meter heads gave the following result:

| | |
|---|---|
| Copper | 88.42 per cent. |
| Tin | 6.59 per cent. |
| Lead | 1.67 per cent. |
| Zinc | 3.32 per cent. |

An examination of the composition of the head of a meter of another make, built at about the same time, gave the following:

| | |
|---|---|
| Copper | 88.17 per cent. |
| Tin | 7.71 per cent. |
| Lead | .55 per cent. |
| Zinc | 3.57 per cent. |

It will be noticed that these two alloys are remarkably similar except for the lead element; at the time of their use they were thought to be especially well adapted to the service and are still so considered.

In this particular meter one of the gears of the intermediate train was subjected to much harder service than any of the others, and it consequently wore out much quicker. It therefore became necessary to make these pinions of a harder composition in order to add to the life of the whole train. An analysis of one of the earlier pinions showed it to be made up as follows:

| | |
|---|---|
| Copper | 86.00 per cent. |
| Tin | 6.25 per cent. |
| Zinc | 7.81 per cent. |
| Lead | Trace |

This metal was found to work so well that it has remained in use up to the present time with only minor change as is shown by the following analysis:

| | |
|---|---|
| Copper | 86.75 per cent. |
| Tin | 5.25 per cent. |
| Zinc | 8.00 per cent. |

This mixture is perfectly adapted to the work but is so hard that the ordinary tools and methods of gear cutting cannot be employed. These pinions have to be cut under water and even then the cutting tool has to be attended to at very short intervals.

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### HIGH DUTY VALVE METAL.

It is well known that brass and copper alloys suffer a marked reduction in strength with increase of temperature. At temperature from 150 to 175 pounds of steam the loss begins to be very rapid and at about 400 degrees F. there is a marked drop in tenacity. From this point to 500 F. the loss is rapid and the strength of the material is seriously affected. In designing their new line of extra heavy and medium pressure brass valves, the Western Tube Company of Kewanee, Ill., determined to use the metal that would show the smallest percentage of loss in this respect that it was possible to obtain. The company therefore inaugurated an exhaustive series of tests with a large number of mixtures of copper, tin, zinc and other metals, with the purpose of determining for itself the best metal for its purpose.

It was found that an alloy that is very commonly used as a steam metal, and would be called a fairly good metal for this purpose, showed a drop in tensile strength of as much as 28 per cent when raised to a temperature of 407 degrees F., which is about the temperature of steam under 250 pounds. The well known government mixture, consisting of 88 parts of copper, 10 of tin and 2 of zinc, was found to have as an average of a large number of bars tested, a cold tensile strength of 33,633 pounds per square inch. When tested at a temperature of 407 F. the tensile strength dropped to 30,675 pounds per square inch, showing a loss of nearly 9 per cent.

As a result of their experiments the company has found an alloy which shows the same tensile strength as the above at 70 F.; and when raised to a temperature of 407 F. the strength is 31,627 pounds per square inch, the loss being only 5.6 per cent. This alloy has been found to be very tough and to possess remarkable wearing qualities. This new metal will be used in the medium and high pressure valves of the company.

### TO CAST ALUMINUM IN IRON MOLDS.

The announcement of the organization of The Fairfield Aluminum Foundry, at Southport, Conn., really means more than the establishment of a new concern. The object of the foundry will not only be to make aluminum castings, particularly all kinds of aluminum automobile parts, but the foundry will make a specialty of casting aluminum in iron molds. John H. Robinson, one of the organizers, had been foreman of the foundry department of the American Graphophone Company, Bridgeport, Conn., for many years and had charge of all of the experiments of the graphophone company in casting aluminum in metal molds. The company spent a great deal of money, time and thought on perfecting their process, and so far as is known they are the only foundry to-day which is successfully casting aluminum in metal molds. The castings were used for their graphophone. The Fairfield foundry will take up the casting of various shapes which can be made to advantage in iron molds and will be ready to execute orders for this line of work. Mr. Robinson will look after the casting end and the other member of the firm, W. Herbert Jennings, will attend to the business part of the enterprise.

### ALUMINUM RACING PLATES.

The metal world hears so much nowadays about the use of aluminum for automobiles that the utilization of this metal on the horse is almost forgotten. The accompanying cut shows an aluminum horse shoe or racing plate which has been on the market a number of years and has proven so satisfactory that it is in constant demand. The shoes are used solely for running horses and are sold at retail for $1.25 per set. The plates have a rim of steel set edgewise in the aluminum. The shoes are rolled out cold, then slotted and the steel is inserted. The shoes are made and marketed by the Bryden Horse Shoe Company, Catasauqua, Pa. Many a race has probably been won by the horse which wore an aluminum shoe, for they weigh but 2 ounces each and racing men say that an ounce off a horse's foot is equal to a pound off its back.


RACING PLATE.

### TANKS FOR ACID PICKLING.

Lead lined tanks are the most suitable for pickling in acid. Burned joints are the best, although common half and half solder may be used in the following way: The sides and bottom should be formed up from one sheet of lead. The edges should overlap at least one inch and be soldered. The soldering should be done on the outside of the lining so as to leave a practically continuous inside surface without solder.

### FORMULA FOR A BURNT BLACK FINISH.

By Wm. Voss.

A good burnt black finish may be made in the following way: Make a saturated solution of nitrate of copper by adding copper to nitric acid until the acid will take up no more. Also make a saturated solution of nitrate of silver. Then to 1 gallon of water add 1 ounce of the copper nitrate and from ⅛ to ¼ ounce of the silver. Dip the articles in this and heat until the black oxide has formed. Repeat the dipping until the desired color has been obtained. After a few trials perfect results can be had without trouble.

### COLD GALVANIZING.

Prof. C. F. Burgess, of Madison, Wis., in a recent paper in the Lead and Zinc News makes the following remarks concerning the solutions used in cold galvanizing. Zinc sulphate is the basis of most of the practical plating solutions; however, satisfactory work can be obtained by it only by careful manipulation. When this salt is dissolved in water and used in a neutral solution the deposit shows a tendency to become spongy, irregular and non-adherent. This tendency is rectified largely by the addition of a very small amount of free sulphuric or free hydrochloric acid. An excess of acid causes the liberation of hydrogen in connection with the zinc or prevents the deposition of the zinc completely, as the metal is redissolved as rapidly as it is deposited. Oxalic and tartaric acid, when added to the electrolyte, allow the attainment of good deposits. They are, however, somewhat too expensive and for ordinary purposes, therefore, glucose and grape sugar have been extensively used and industrially operated with some success.

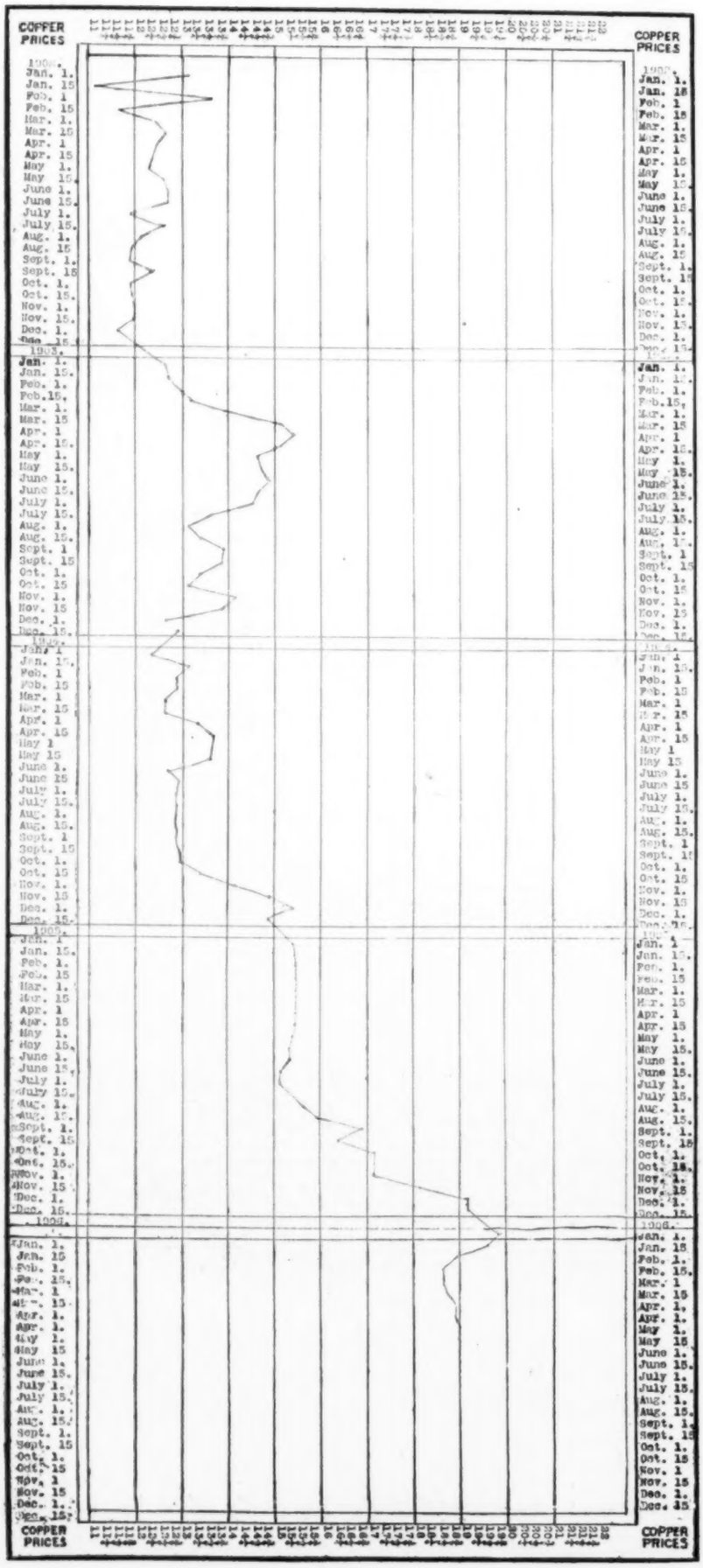
For some reason not clearly apparent the presence of aluminum in a zinc sulphate solution causes the zinc to deposit in a smooth, bright and dense coat. The aluminum may be placed in the solution in the form of aluminum sulphate or, as is ordinarily the case, in the form of sodium alum. The method of setting up the solution is to add aluminum sulphate to a zinc sulphate solution and then to add a very small amount of acid, sufficient to prevent the formation of a precipitate.

Prof. Burgess states that a patent which has recently been granted in the United States seems to be an improvement in zinc solutions and that some of the claims have been verified by tests made in his laboratory. The improvement results from the discovery that certain boron compounds, when added to the common zinc bath, are highly advantageous, the boron compounds being added in the form of borax or boracic acid.

### PRODUCTION OF FLUORSPAR IN 1905.

In 1905 the total production of fluorspar, according to Edmund O. Hovey of the U. S. Geological Survey, was 57,385 tons, valued at $362,488. Most of this came from the mines in Illinois and Kentucky. The Illinois production amounted to 33,275 net tons, valued at $220,206, an increase of 16,070 net tons over the reported production of 1904. Kentucky has fallen to second place, the output in 1905 being 22,694 net tons, valued at $132,362. This, however, is an increase of 3,598 net tons over 1904. In Tennessee, 25 tons of fluorspar were mined last year, but not sold.

The price of the Illinois crude material ranged from $5 to $8 per ton, the average being $5.26. The Kentucky spar averaged $4.74. In 1905 the price of ground fluorspar varied from $10 to $12 per net ton.




## A CHART OF COPPER PRICES.

By W. H. Roberts.

In some lines of manufacturing and especially in the brass industry it is often important to be able to obtain at a moment's notice the price of copper at a certain time, sometimes within the last few weeks or often extending back three or four years, as for instance you receive a request for a quotation on a brass article which you have made before, and considering that you know the cost of labor at that time, the selling price of the article will depend largely on the cost of copper for that month.

This chart is offered as a suggestion in furnishing a handy reference of copper quotations on the first and 15th of each month, at the same time allowing the opportunity to compare prices of copper from month to month, as a glance at the chart shows all the fluctuations in copper for the past four years. By enlarging the chart a record may be kept of the price of copper for each day, but in most cases this is hardly necessary as the price on the first and 15th is usually enough for reference and also shows all the fluctuations that have any bearing on the price of manufactured goods.

For convenience the price of copper is marked on both the top and bottom of the chart and the dates on both sides. The prices on the chart vary ¼ cent.

Supposing you wished to find the price of copper on the first of January, 1903, you simply find the date marked on the chart and follow across until you meet the wave line at right angles with the date, and this point will give the quotation for that day; and if you wish the date that copper reached the highest point in a certain year you follow from the highest point of the wave line to the side of the page which shows the dating.

The chart will also show at a glance the movement of copper at the beginning of each year and at the end. Thus we find that in 1902 and 1903 the price of copper returned to about the same figure at which it started and since 1904 the price has been steadily advancing and always higher at the end of the year than at the beginning, the highest point being reached on the first of this year.

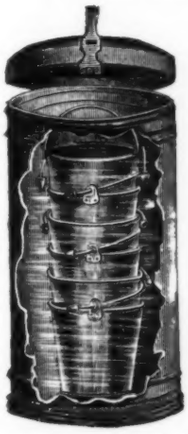
Of course this information can be kept in a book, which is generally done, but this method does not allow of nearly as good an opportunity for comparing the price with the same date in previous months, nor does it offer the same chance of studying the movement of copper at certain periods.

The chart can also be applied for recording the price of tin, zinc, lead or any other metal, but in the brass industry, while these other prices are sometimes needed, yet the cost of your metal depends more largely on the price of copper, as the price of the other metals follows more or less in proportion.

# INDUSTRIAL

NEW AND USEFUL MACHINERY, DEVICES, APPLANCES AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

## THE SAFETY FIRE TANK AND BUCKETS.

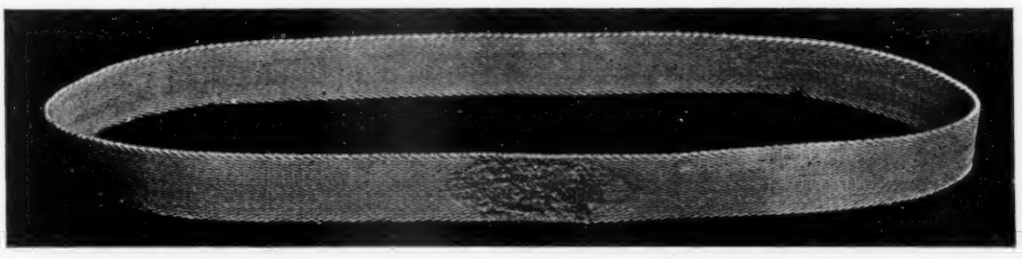


SAFETY FIRE TANK AND BUCKETS.

The safety fire bucket tank and buckets, made by the Safety Fire Extinguisher Company, 29-33 West 42nd street, New York, are simple, efficient and always ready to be used to repel the unwelcome visitor. They are made of heavy galvanized iron and are lined to prevent rust. The tanks are japanned red on the outside, and have a hinge cover which closes down on a rubber packing so as to make the tank air-tight, thereby preventing evaporation. The handles of the buckets are weighted so that when the top bucket is removed the handle of the next will rise automatically while the second bucket is filling. Each bucket has two lugs on the outside so that when they are placed in the tank, one inside the other, they rest on the lugs and consequently can not bind or stick. Every tank is accompanied by a bag of powder, which, dissolved in water, is a powerful fire extinguisher. Where the tanks are to be used in exposed places a compound is provided that will prevent the freezing of the water. When the six buckets have been removed there is enough solution left in the tank to refill four of them.

## ENDLESS POLISHING BELTS.

Not very many years ago the endless polishing belt was an unknown quantity; but to-day, in every up-to-date polishing plant, it is indispensible. The amount of manual labor that these belts save in the course of a year amounts to many thousands of dollars to the manufacturers of polished goods in this and other countries. Not only is the work done better, but on the average from ten to twenty times quicker than was possible with the file and oil and emery. Their value is particularly noticeable in polishing irregular shapes, and curves and angles.



THE GILMER ENDLESS POLISHING BELTS.

The endless standard polishing belts manufactured by L. H. Gilmer & Company, of 3952 Market street, Philadelphia, Pa., are made with a patented splice which gives the belt a perfectly smooth surface throughout its length. This matter of the splicing is of the utmost importance since a joint that presents inequalities in the surface interferes with the working of the belt and reduces its efficiency very materially. A true and even surface is of vital moment if output and character of work are to be considered. In addition to this admirable feature of uniformity, the joint is so formed as to be quite as strong as the rest of the belt and the durability of the belt is thereby increased. The webbing used in the manufacture of these belts is woven specially for the company and is the gradual development of many experiments. It has a life many times greater than ordinary webbing and will wear half way through before breaking. Owing to the peculiar method of weaving it will unravel but very little on being cut.

The standard (H-99) endless belts are made in widths from ¾ to 3 inches.

## ZUCKER & LEVETT & LOEB EQUIPMENT.

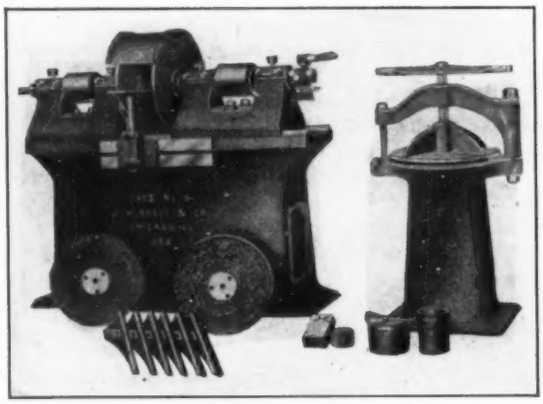
The Zucker & Levett & Loeb Company has practically recovered from the complete burn out from which they suffered last May. They are in a newer and better building than they were before, having 20,000 square feet of additional floor space, almost double their former size. Their new building fortunately adjoins their old factory, 525 West 25th street, New York, therefore visitors do not have to go out of the beaten paths to find them. They are now in a position to take care of their customers and make prompt shipment. One of the specialties that they brought out just before the fire was a new revolving plating apparatus which was illustrated and described in the May issue of THE METAL INDUSTRY. It was developed and patented by the superintendant of the company, C. G. Backus, and who has also designed recently a balance for polishing wheels. The company have again begun to manufacture this apparatus as well as all other supplies.

## ABRASIVE MATERIALS.

The total value of all abrasive materials consumed in the United States during the year 1905 was $2,784,001, according to an extract from the Mineral Resources of the United States. About half the quantity consisted of artificial abrasives, carburundum, crushed steel and alundum. Concerning emery and corundum the report says: "Never in the history of the abrasive industry has the time been more opportune for the development of corundum properties than at present when there is a scarcity of emery ore. Many of the mills of the United States are finding it difficult to keep their mills supplied with emery. The Greek and Turkish deposits are not furnishing the grade of emery that is desired, nor the quantity, and this has also been true during the past year of the emery mines in this country. The increasing demand for this type of abrasive should give an impetus to the development of the domestic corundum deposits."

### DOUBLE HEAD DISK GRINDER.

Charles H. Besley & Company, of Chicago, have placed on the market their re-designed No. 6 double head disk grinder. Particular attention has been paid to obtaining perfect alignment, that the disk wheels shall run parallel and at right angles to the work table. The heads rest on V's planed on the top of the column; this construction insures true alignment and prevents emery dust from getting under them. Not the least important feature of the machine is the bearings. The machine is regularly built with spindles of crucible steel running in adjustable cast iron bearings of unusually large proportions, but when desired the machines are made with phosphor bronze bushings. Both spindles and bushings are readily accessible. The end motion of the spindles is controlled by adjustable collars held in place by lock nuts on the end of the spindles, and the end thrust is taken on



THE BESLEY DISK GRINDER AND DISK WHEEL PRESS.

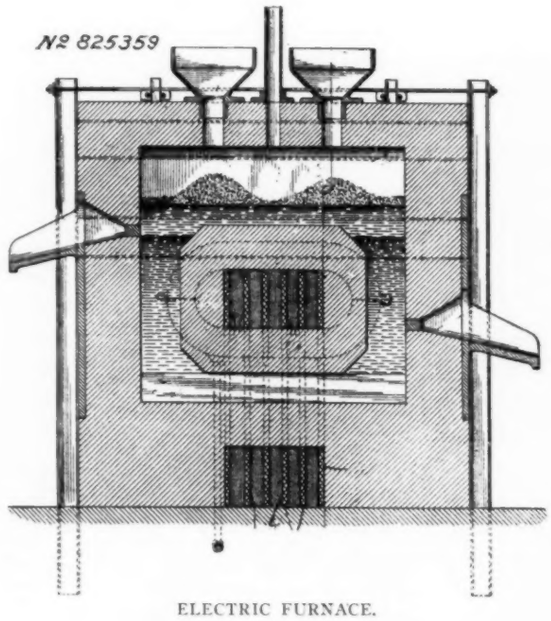
hardened and ground collars of large area. The position of the spindles is thus maintained rigidly under heavy service.

All the flat and cylindrical surfaces are ground and scraped. The sliding spindle has only about one inch movement endwise and is entirely incased in its bearing housings, and these bushings slide with the spindle. This slight end movement of the sliding spindle insures that the disk wheel carried by it will always be near to and rigidly supported by the main head casting. The machine is fitted to be lubricated by compression oil cups and Helmet solid oil, and the bushings have ample oil grooves and oil holes for using this lubricant. The travel of the oil is always outward, which prevents emery dust working in.

The machine swings disk wheels up to 20 inches in diameter. The opening between the wheels is from 0 to 20 inches. The sliding spindle is brought up to the work by a pinion connected with a hand lever, engaging a rack on the back of the bearing bushing. This gives the operator a leverage of 20 to 1 and the grinding disks can be brought against the work with sufficient pressure to obtain the best results. The rack and pinion mesh vertically so that emery dust will not lodge between them. An opening in the bed provides for the attachment of an exhaust pipe for carrying away the dust. The work rest bracket is very rigid, and the T-slot in front of the bed and the V's on the bed readily adapt the machine for holding any apparatus which may be required on special jobs. Either or both heads may be easily removed. The disk wheels are spirally grooved steel. The machine weighs 3,500 pounds.

### ELECTRIC FURNACE.

An electric furnace of the induction type has been patented (July 10, 1906) by Frederick T. Snyder of Oak Park, Ill. The metal to be heated is placed in inductive relation to a magnetic core having a primary winding included in the circuit with a source of alternating cur-




ELECTRIC FURNACE.

rent. In this manner the metal to be heated forms the whole or a portion of the secondary element of a transformer. By this means a very intense current may be directly induced in the material forming the secondary circuit, the energy of this current being transformed into heat.

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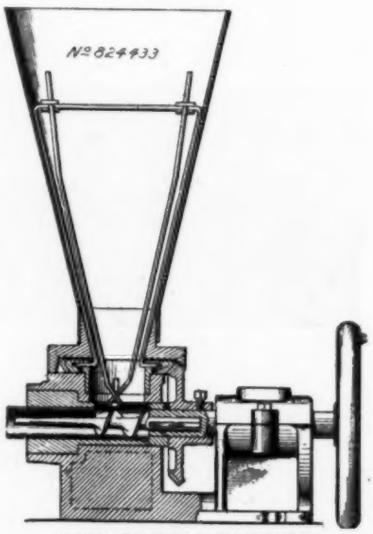
### CORE MAKING MACHINE.

The core making machine invented (June 26, 1906) by John S. Nicholson, of Los Angeles, Cal., is provided



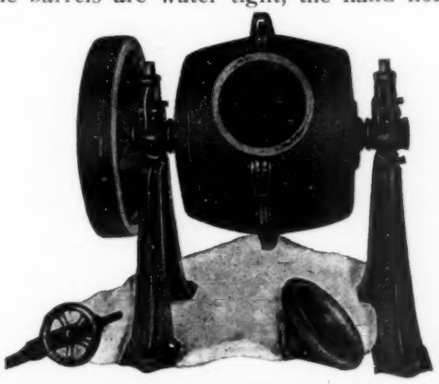

CORE MAKING MACHINE.

with means for properly agitating the material out of which the core is made. It feeds the material to the core-

forming screw and prevents it from packing in the bottom of the machine while in operation. Extreme simplicity marks the construction of the machine.

### THE GLOBE HORIZONTAL WATER TUMBLING BARRELS.

The horizontal water tumbling barrels manufactured by the Globe Machine & Stamping Company, Cleveland, O., are especially valuable in brass foundries making a small range of castings, weighing one pound each or less. The barrels are water tight, the hand hole being



THE GLOBE HORIZONTAL WATER TUMBLING BARRELS.

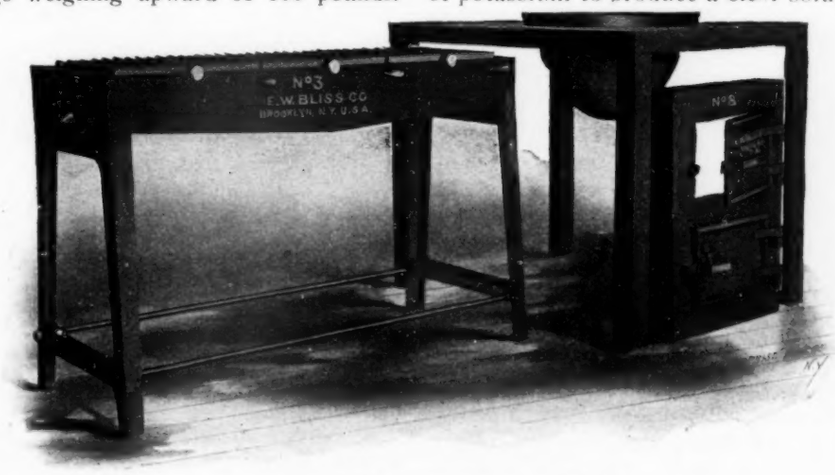
fitted with a rubber gasket and an iron hand hole cover locked in place by a hand screw. The machine is arranged so that it can be operated in a convenient way and the prices are quite low for this quality of machine. It is now made in two sizes, one having a barrel 18 by 18 inches, and the other with a barrel 20 inches in diameter by 30 inches long.

### SOLDER MOLD AND MELTING FURNACE.

One of the most important items in the manufacture of pieced tinware is the proper preparation of the solder used on the seams. The lead is generally received at the factories in pigs weighing upward of 100 pounds. When the lead is to be used it is, for convenience, melted and cast into small molds.

To do this molding in the most expeditious manner the E. W. Bliss Company, of 16 Adams street, Brooklyn, N. Y., have just brought out a combined melting furnace and solder form, shown in the accompanying illustration. The mold has three sections with twelve compartments to each section for making at one pouring thirty-six bars of solder, 14 inches long by ⅝ inch thick, 1 inch wide at the top and ⅝ inch wide at the bottom. The table is 32 inches high, 22 inches from front to back, and 54 inches from right to left. The total weight is 500 pounds. The solder is removed by withdrawing the handle shown and allowing the sections to tilt. The mold has no provision for paneling or lettering, but a similar mold may be made with any lettering desired.

The melting furnace has a pot 15 inches deep by 19¾ inches inside diameter. The table is 46 inches wide by 36 inches deep and is 39 inches high. The weight of the castings which are to be set in masonry is about 900 pounds.




SOLDER MOLD AND MELTING FURNACE.

### SOME BIRMINGHAM PLATING SOLUTIONS.

A Birmingham (England) plater who was returning home after a visit to the United States called at our office and, after a general discussion of plating methods in England and America, left the following formulas which he said yielded very excellent results.

For an antique green gold, a solution is made up by using 4 dwt. 18 grains of fine gold, 1 dwt. and 6 grains fine silver, which should be converted to chloride and relieved in 1 gallon of water containing ½ ounce of C. P. cyanide of potassium, temperature for use 160 degrees. Anodes should be of nearly the same composition as the solution.

For a brass solution he gave the following formula: In 25 gallons of water dissolve 14 lbs. C. P. cyanide of potasium, in 5 gallons more water dissolve 15 lbs. carbonate of soda and 2½ lbs. of bisulphate of soda, then add 7½ lbs. dry carbonate of copper, and 6 lbs. dry carbonate of zinc, mix the solutions of cyanide and salts together. Anodes of cast yellow brass should be used. The solution gives a good heavy deposit. It should be used slightly warm.

A gold color to be used in connection with the above formula is prepared by dissolving

4 lbs. sulphate of iron crystals,
4 lbs. bisulphate of soda,
2 lbs. sal ammoniac,

in 5 gallons of water, using sufficient C. P. cyanide of potassium to produce a clear solution, which should be boiled for half an hour. For producing the gold tint 1½ ounces should be added to each gallon of brass solution in use.

A brass bath replenisher should be made up by dissolving

2 lbs. carbonate of soda,
1 lb. bisulphate of soda,
4 lbs. zinc carbonate,
6 lbs. copper carbonate,

in as small an amount of water as possible and sufficient cyanide to produce a clear solution.


# CORRESPONDENCE


IN THIS DEPARTMENT WE WILL ANSWER ANY QUESTION RELATING TO THE NON-FERROUS METALS AND ALLOYS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

## METALLURGICAL.

Q.—We are troubled with burnt sand inside of cored castings. Is there any way of taking this sand out that you know of?

A.—A 10 or 15 per cent solution of hydrofluoric acid is the best pickle for removing burnt sand from cored castings. The castings may remain in the solution for 1 or 2 hours or more. The acid does not affect the metal, but will remove the sand. It is well to give them a light dip afterward in the regular acid bright dip to bring up the color.

Q.—We are using scrap copper wire in the manufacture of brass valves, and occasionally there is a piece of iron wire mixed in with the copper. It seems that this causes a dark or black spot on the outside of the casting. We should like to have a formula for a dip that will remove these blotches.

A.—A little sal ammoniac added to your metal just before pouring, and then thoroughly stirring, will bring the iron to the surface, when it can be skimmed off. A strong solution of hydrofluoric acid, say half acid and half water, used slightly warm will also remove the stains from the surface when immersed from fifteen minutes to half an hour. The acid does not affect the brass but will act upon the iron and sand only.

Q.—The writer would like to know what effect the draft would have on crucibles where it takes from 11 to 12 hours to go 5 rounds, as he has experienced quite a little trouble in the crucibles not standing up more than 20- to 24-hour heats. In the past the same crucibles have stood up for 34 to 40 heats with the casters going out in from 8 to 9 hours.

A.—There is no doubt that an excessive draft has a detrimental effect upon the crucibles, burning them out in half the heats they should naturally accomplish under a fair draft. Not only is this true of the crucibles, but with an excessive draft the melting temperature is not maintained since too much heat of combustion escapes through the chimney. For this reason the heats take longer than they should under normal conditions.

## PLATING AND FINISHING.

Q.—We do considerable copper plating in tumbling barrels. In the past we had no trouble to plate bright, but now the work comes out dark. The solution smells strong of ammonia and turns red litmus paper.

A.—We would advise you to keep ammonia out of your copper solutions if you desire a bright color. Ammonia has a tendency to produce copper deposits of a dark reddish tone. By the appearance of the sample you send we should think hyposulphite of soda had been added to the bath. This is recommended by some people to produce a bright deposit, but it has, instead, an opposite effect. When the ammonia has evaporated from the solution add a small amount of cyanide of potash and 1 oz. each of bisulphite of soda and sal soda to each gallon. This should give a good bright red copper color.

Q.—I want a formula for making a 50-gallon solution for plating on iron for a brush brass finish. This must be a good yellow brass.

A.—There is always some difficulty in preparing a brass solution direct, so it is well to first make a copper solution and get that in working condition. By this method it is possible to produce the color desired. For a 50-gallon copper solution take the following:

| | | |
|---|---|---|
| Bisulphite of soda | 8¾ | pounds |
| Carbonate of soda | 10 | pounds |
| Carbonate of copper | 8¾ | pounds |
| Cyanide of potassium 98% | 11¼ | pounds |
| Water | 50 | gallons |

The cyanide is dissolved in half the water and the soda in the other half, adding the copper carbonate to the soda salts. The two solutions are then mixed and boiled for one-half hour. Connect up the tank and run for an hour or two and when a good deposit has been obtained the solution may be changed to a brass one. Dissolve 5 pounds cyanide of potassium in as little water as possible and add 2½ pounds carbonate of zinc. Add this solution, slowly, to the other, stirring all the time. Now try the bath. If the color is not satisfactory add aqua ammonia, 26 per cent., from one quart to one-half gallon, until a good brass color is obtained. If the solution produces a smoky brass dissolve one-quarter ounce white arsenic and one-half ounce caustic soda in a little hot water and add to the solution. Use anodes of soft sheet brass.

Q.—Kindly give us full particulars for coloring britannia, or so-called white metal.

A.—To produce a good roman gold on britannia metal it is necessary to copper or brass plate the articles first. Then scratch brush them with a fine brass brush, clean and gild in a hot bath. For a dip gold make up the following:

| | | |
|---|---|---|
| Caustic potash | 5 | pounds |
| Bicarbonate potash | 1¼ | pounds |
| Cyanide potassium | ½ | pound |
| Neutral chloride gold | 2 | ounces |
| Water | 5 | gallons |

The solution should be prepared by dissolving the cyanide and gold in part of the water and the soda salts in the other part. Mix the two and use at a nearly boiling temperature in an iron kettle. The following may be used for an electro solution:

| | | |
|---|---|---|
| Phosphate soda | 8 | ounces |
| Sulphate soda | 1½ | ounces |
| Cyanide potassium 98% | 6 | pennyweights |
| Neutral chloride gold | ½ | ounce |
| Water | 1 | gallon |

Use at a temperature of 180 degrees with a gold or platinum anode. For a copper solution:

| | | |
|---|---|---|
| Acetate of copper | 8 | ounces |
| Bisulphite soda | 8 | ounces |
| Carbonate of ammonia | 1½ | ounces |
| Cyanide potassium | 9½ | ounces |
| Water | 2 | gallons |

This makes a heavy deposit.

Q.—We have trouble with our nickel tank not putting on the nickel white enough. We have tried using salt but it does not have the desired effect.

A.—Have you made an examination of your anodes?

Perhaps they are covered with a graphite dirt and are not yielding up the nickel because of this coating. If you find this so, boil out the anodes and scrape them well. Your solution is probably deficient in nickel; add 2 or 3 ounces single sulphate of nickel each gallon of solution. It would be as well to try a small amount first. Remove 10 gallons and place in a jar and add the required amount of the sulphate. Connect up and try on a sample article; if this works all right correct the whole bath. It not, add 1 or 2 ounces of sal ammoniac in connection with the sulphate. This method will increase the metallic content of the bath and also increase the conductivity and should produce a white deposit.

Q.—Please send me a receipt for a satin finish and (2) also for a verde antique on copper plated lead figures. I have tried some of the receipts I found in THE METAL INDUSTRY, but on account of the work being nearly all smooth I have had some trouble. The firm wishes me to make a dirty greenish on the smooth parts and a bluish green on the back grounds.

A.—By adding ¾ pound of sulphate of zinc to the regular bright dip and a little muriatic acid, a satin dip may be produced. Immerse the articles for a few minutes, remove, wash well and pass through the potash; wash and then pass through the regular acid dip. To produce a new satin dip dissolve 6 ounces of sheet zinc in each gallon of 38 per cent. aqua fortis used. When cold add an equal amount of oil of vitriol. Handle the work as above mentioned. (2) To produce a bluish green on the raised surface of your verde antique articles you will have to stipple the plain surface after immersing and drying by any of the methods you have tried. Make up a second solution consisting of 1 ounce sal ammoniac, 1 ounce water ammonia and 1 pint water. Moisten a stippling brush with a little of this and stipple the plain parts. If this does not produce a sufficiently deep color after drying, immerse in clear cold and move the articles about. This should produce a rich bluish green. The articles should be oxidized after coppering to produce the best results.

Q.—Will you kindly publish a solution in which we can dip brass or iron wood screws to get a black or gun metal finish without going through the process of copper plating?

A.—For producing a black finish on brass screws see a short article in THE METAL INDUSTRY of May, 1905, by Chas. H. Proctor, on Oxidizing Brass by Immersion in Ammonia Copper Solution. For blackening iron wood screws prepare a solution as follows:

| | |
|---|---|
| Sulphate of copper..... | 3½ ounces |
| Oil of vitriol..... | 3½ ounces |
| Water ..... | 2 gallons |

Clean the screws as thoroughly as for plating. Immerse them for a few seconds in the solution, which will copper coat them. Wash and immerse in a solution of sulphuret of potassium, 1 ounce to the gallon of water, and add ½ ounce 26 per cent. water ammonia. Immerse until sufficiently black, then wash, dry and lacquer. If the copper does not adhere well dilute until the deposit is satisfactory.

Q.—What causes the thickening of a silver solution? Is potassium carbonate a sort of precipitate or is it held in solution?

A.—Potassium carbonate is one of the constituents of cyanide of potassium. The hydrocyanic acid decomposes by the action of the current, leaving the potassium carbonate held in solution. For this reason it is sometimes necessary to add hydrocyanic acid to the bath when several years in use. This, combining with the carbonate of potassium, forms potassium cyanide and enriches the bath in the same way cyanide does. It is well to add ¼ ounce hydrocyanic acid to each gallon of solution, especially when the anodes have a tendency to remain black after the current has been shut off for any length of time; this also prevents the undue thickening of the bath.

Q.—Will you advise us of a process for cleaning bright or polished steel for plating, without scouring with pumice? Also give me the best silver solution.

A.—For cleaning bright or polished steel see article on "Electro Chemical Cleaning Baths and Their Uses" in THE METAL INDUSTRY for October, 1905. The usual method is to wash the articles in benzine or gasoline, dry out in sawdust and immerse in a nearly boiling solution of "Kalye." Then wash and dip in a 10 per cent. solution of muriatic acid; wash and plate directly. A silver solution that will give satisfactory results on all metals should consist of

| | |
|---|---|
| Silver chloride ..... | 2½ ounces |
| Cyanide potassium ..... | 6 ounces |
| Water ..... | 1 gallon |

Q.—I have a couple of rheostats of the ordinary long board variety. The contacts, arms and terminals are of cast brass, of good carrying capacity, but are minus the wire. I want to use one on a 150-gallon cyanide copper and the other on a 300-gallon nickel solution. What size or sizes of wire shall I put on them?

A.—If you have a large excess of current use very soft iron wire of three sizes: Nos. 16, 12 and 10 B. & S. gauge. If your current is not very excessive use copper wire from Nos. 16 to 8, B. & S. These sizes should give you variation enough for the size of your baths.

Q.—I am very anxious to obtain the dip for brass called "No. 2 Hardware Finish."

A.—There are so many formulas for brass dips we hardly know which to recommend. We do not know of a formula that would produce No. 2 hardware finish; that is probably only a trade name. If you had submitted a sample of the finish you desired we might have been able to help you. One of the best formulas for the regular bright acid dip consists of

| | |
|---|---|
| Aqua fortis, 38 per cent..... | 1 gallon |
| Oil vitriol, 66 per cent..... | 1 gallon |
| Rock salt ..... | 8 ounces |
| Water ..... | ½ gallon |

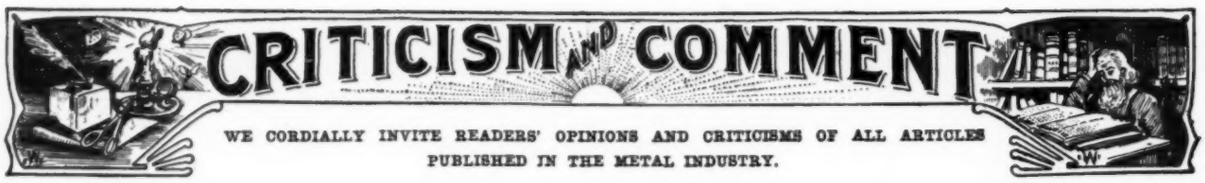
The mixed acids should be prepared 10 or 12 hours before using. Add the oil of vitriol to the aqua fortis and then add the salt little by little.

Q.—I have had considerable trouble with the silver chipping off of steel knives that have been replated. I have given them a light coat of copper before putting them in the silver strike. I then gave them a 45-minute plate, 15 minutes to each plate, taking them out and scratch-brushing each time. After they have been used a while they chip along the edge. Do I give them too much plate, or is there a dip of mercury that they should be put in before the silver strike?

A.—The usual method of plating steel knives and forks, after preparing a chemically clean surface, is to nickel plate them for at least 15 minutes in a nickel solution slightly acid to the blue litmus paper test. Wash them thoroughly and strike them quickly for a few seconds in the silver strike with a strong current; then place them in the regular bath until a sufficient deposit is obtained. With the method you are now following it is necessary to use a mercury dip, which may be made as follows:

| | |
|---|---|
| C. P. cyanide ..... | 2 ounces |
| Yellow oxide mercury..... | ⅛ ounce |
| Water ..... | 1 gallon |

After coppering and washing, immerse them in the dip for a few seconds; wash and proceed in the usual manner.




### A CORRECTION.

To the Editor of THE METAL INDUSTRY:

In your issue of July, under the heading of Plating and Finishing, you say in your answer to the second question that the presence of copper in a nickel anode produces a blackish deposit and makes the anode unfit for use. Farther along in the answer to question 12 you say all nickel anodes contain a percentage of copper. How do you justify these two statements? X. Y.

[We don't. We just lay the burden on the back of the poor printer, who bears editorial sins and blunders along with his own. The last sentence of answer 12 should read "All nickel anodes contain a certain per cent. of iron," not copper.—ED.]

### COPPER IMPURITIES.

To the Editor of THE METAL INDUSTRY:

Replying to the criticism of Andrew M. Farlie, published in your July number, I did not mention Lake copper in my article on the "Practical Application of Scientific Metallurgy to the Foundry and Rolling Mill," as it is, practically speaking, a very good quality Best Select. I purposely omitted naming any particular brand as it would not be fair to other makers. I did not mean to imply that 0.5 per cent arsenic, 1.0 per cent nickel, 0.1 per cent iron and 0.25 per cent antimony occur as a rule in B.G. copper, but only on rare occasions, and I should reject copper containing any one of these impurities in the above quantities, if it was sold as B.S. ingot. I wished to show the effect of these impurities on alloys and the importance of chemical analysis. I ought to have mentioned that Electrolytic copper contains 99.9 per cent copper and upwards. B.S. ingot should contain at least 99.6 per cent, and tough ingot 99.4 per cent and upwards.

ERNEST A. LEWIS.

### SILVER PLATING STEEL KNIVES.

To the Editor of THE METAL INDUSTRY:

I have had trouble getting the silver to adhere to steel knives. I followed your instructions in every respect except that in the cyanide solution I used iron anodes instead of copper. The blanks also have a tendency to rust before I can get them scoured, if I am doing a quantity at a time.

[To produce a successful deposit upon steel needs the utmost care and attention both in regard to cleaning and the solutions used. The method usually followed in cleaning consists of boiling out in a strong potash solution, washing, passing through undiluted muriatic acid, immersing in a 10 per cent. solution of sal soda. Scour directly from the soda with a tampico wheel and pumice stone or powdered flint. Wash and place in a 5 per cent. solution of soda until ready for plating. After wiring or framing, the articles are passed through hot and cold potash water baths; passed through a 25 and a 10 per cent. solution of muriatic acid; washed and passed through a clean strong potash bath and then to the striking solutions. In regard to the size of anode used in the second strike, the copper surface should be four times as large as the silver one. In the depositing bath there should be but little free cyanide as it has a tendency to produce peeling when in excess. A good method of plating steel knives with only one strike consists in cleaning as above; then flashing in a nickel bath for a few minutes. Wash and immerse in an acid copper bath composed of sulphate of copper 1 pound, sulphuric acid 4 ounces, glycerine ½ ounce, water 1 gallon, for 10 or 15 minutes. Use anodes of soft sheet copper. Wash well and immerse in a mercury or blue dip consisting of oxide of mercury ⅛ ounce, cyanide of potassium 2 ounces and water 1 gallon. Wash and strike in a regular striking solution and pass directly into the regular path. This method gives good results and does not need as much care as when depositing directly upon steel.—ED.]

### NEW BOOKS.

OUTLINES OF THE EVOLUTION OF WEIGHTS AND MEASURES AND THE METRIC SYSTEM. By Prof. William Hallock and Herbert T. Wade. Size 6x9. xi—304 pages. The Macmillan Company; New York and London. 1906. Price, $2.25.

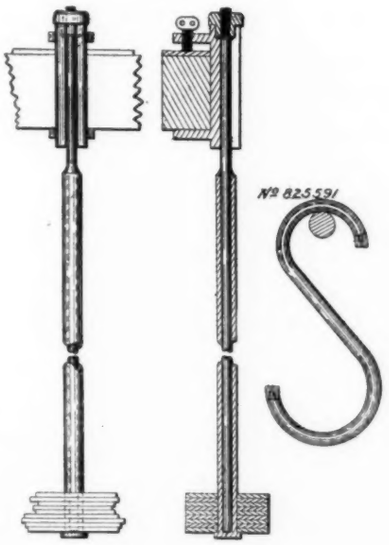
This volume was written with the object of presenting a comprehensive view of the evolution of the science of metrology. It is designed both for the student and general reader and is free, so far as possible, from technical language. The authors, while briefly outlining the systems of weights and measures of the ancients, have wisely declined to discuss their origin. The first suggestion of a comprehensive decimal system having as a basis the length of an arc of one minute of a great circle of the earth was made by Gabriel Mouton, of Lyons, in 1670. The book very appropriately reviews with considerable detail the endeavors of the French government and scientists to determine and introduce the metric system as we understand it to-day. In a decree of 1795 the meter was officially defined to be equal to the ten-millionth part of a terrestrial meridian lying between the north pole and the equator. But three years previously a commission had been appointed to measure the French meridian from Rodez to Barcelona. A description is presented of the methods of making the the physical difficulties of making and duplicating standards is dwelt upon. Perhaps the most valuable work in this direction was done by Professor Michelson when he measured the meter in terms of the wave lengths of different colors with a degree of accuracy as great as 1-40,000 of a millimeter. A strong plea for the metric system is brought forward in three chapters which show the advantages of the decimal method in commerce, in manufacturing and in medicine and pharmacy. This shows the confusion now existing between the different gages for wire and sheet metals, and the demand for a more harmonious arrangement. Tables at the end of the book show the metric equivalents of our own measures. A copious index provides convenient reference.

Ontario, Canada, is one of the largest producers of nickel, its only real competitor being New Caledonia in the South Seas. The Sudbury nickel field has long been known as the most important source of that metal in America, if not in the world. The main source is a huge rock a mile and a quarter thick, 36 miles long and 17 miles wide. The ore bodies are around the margin.

# PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

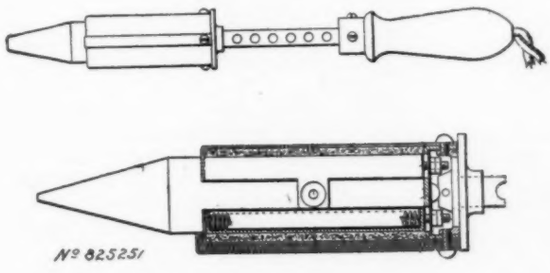
825,591. July 10, 1906. Support for Anodes. Frank, F. H. and W. A. Engelhard, Springfield, Mass. This support has sufficient strength to maintain the weight placed upon it, and is impervious to the fluid in which it is immersed. The cuts




clearly show the construction. With this method of supporting anodes in plating solutions it is possible to use cruder forms of anodes, such as the tops or unused portions of old anodes, which are usually sold for old metal. No fastening is needed at the top and the whole anode may be immersed.

825,386. July 10, 1906. Electric Furnace. John F. Hammond, Brewster, N. Y. This invention embodies an improved method of applying heat to the segregated portions of the furnace, and for so controlling the current passing through such portions as to cause the increase of temperature of the furnace to be very gradual.

825,251. July 3, 1906. Electric Soldering Iron. Tycho Van Aller, Schenectady, N. Y. Assigned to the General Electric Company, New York. This patent relates to electrically heated soldering irons. The tip has one or more recesses in its sides in which are heating coils of wire covered with heat insulating



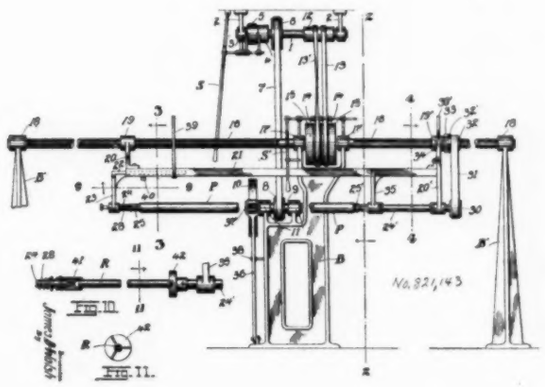

substance. The coils are preferably connected in series and current is led to them by flexible conductors passing through the tubular handle. When the current is passed through the coils, they become highly heated and impart their heat to the tip very readily by reason of their close proximity to the shank.

825,100. July 3, 1906. Process of Treating Copper and Other Metals. John A. Yunck, South Orange, N. J. This invention relates to the deoxidation or other purification of metals and alloys to prepare them for the casting of sound and flawless ingots free from blow holes or impurities that tend to interfere with such metals being cast, rolled or drawn.

824,875. July 3, 1906. Extruding Metal. George W. Lee, Binghamton, N. Y. The tubular metallic bodies of any suitable metal—like aluminum, for instance—are formed by confining a blank of cold metal against lateral extension and subjecting it to intense pressure under the immediate impact of a fluid. By means of the fluid all the metal contained in the blank may be extruded from the die, leaving the die free for the reception of the next blank.

826,157. July 17, 1906. Casting Brass or Other Copper Alloys Into Metallic Molds. John E. Fowler, Youngstown, O. In this method the interior of the mold is treated with a covering of borates, which is done by treating the surface to the action of a boron compound in dilute liquid solution, such as will produce the borates. This is applied by dipping or washing. This borasic acid solution has great penetrating effect upon the iron or steel mold and which he claims forms an effectual barrier to the union of the mold with the molten metal.

821,143. May 22, 1906. Feed Mechanism for Polishing Machines. J. D. Walsh, St. Louis, Mo. The device is intended particularly for tubes and rods and is designed to reduce the cost




of polishing and at the same time turn out a great quantity of work. The pipe or rod is fed past the polishing wheel by a carrying frame which is moved by a screw. The machine is extremely simple in design.

824,962. July 3, 1906. Core Box Cutter. Frank E. Thomas, Portland, Me. With this cutter the straight core can be formed, or a hemispherical recess may be formed in the block.

824,317. June 26, 1906. Molding Machine. Harris Tabor, Elizabeth, N. J., assignor to the Tabor Manufacturing Company, Philadelphia, Pa. This is a comparatively inexpensive, compact, reliable and efficient rock-over molding machine well adapted for use even in connection with patterns having comparatively straight sides and considerable depth.

824,655. June 26, 1906. Wire Drawing Machine. James A. Horton, Providence, R. I. Assigned to the Iroquois Machine Company, New York. In this machine are the usual wire drawing dies and drawing drums adjacent to the dies. As the wire is drawn through the dies provision is made for rotating the drums at different speeds as required by the elongation of the wire in the several drums. The wire is drawn dry and excessive heating of the dies and wire is prevented.


# TRADE NEWS


**TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.**

The recently incorporated Kokomo Brass and Plumbing Company, Kokomo, Ind., will construct several new buildings of brick, stone and iron.

Wm. F. Renziehausen Company, of Newark, N. J., are making a specialty of silver anodes and sterling silver. They are also buyers of gold, silver and platinum.

E. Reed Burns, a manufacturer of brass and nickel platers' supplies, of Brooklyn, N. Y., reports a steady business, with encouraging prospects for the fall trade.

The Boissier Electric Company, of 478 Pearl street, New York, are prepared to handle the approaching fall trade with their new electro-plating apparatus, recently patented.

The Mission Brass Works, of San Francisco, Cal., were but slightly damaged by the earthquake and escaped the fire entirely. They are now very busy with orders far ahead.

The Phillips Company, manufacturers of engine boiler attachments, have moved their factory from Boston to 35 Skilton avenue, Somerville, Mass., near the Winter Hill Station.

The Fowler Brass Works, of Chicago, Ill., have just introduced some new telescope sleeve fittings made of nickel plated brass which are used as a covering over galvanized or iron pipes.

The Owen C. Hasler Company, of Chicago, Ill., are now doing a very nice metal polishing business. They report that their establishment is well equipped and up to date in every respect.

The Chamberlin Company, of Albany, N. Y., have outgrown their present quarters and have moved into the Albany Trust Company Building. They manufacture metal building specialties.

E. H. Barton and W. S. Doble have formed a partnership, to establish an iron and brass foundry at Torreon, Coahuila, Mexico. A specialty will be the making of iron and brass bedsteads.

The new brass foundry and finishing shops of the Speakman Supply & Pipe Company, Wilmington, Del., have been completed and are now occupied. The new plant is up to date in every respect.

The Veeder Manufacturing Company, Hartford, Conn., makers of cyclometers and tachometers, will erect a new building 42 x 56 feet, three stories and basement, to be devoted to office and salesroom.

The Torrington Manufacturing Company, of Torrington, Conn., builders of special machinery, report that their new building is ready for the iron work and that they hope to have it completed this month.

O. J. Moussette, manufacturer of crushers at Driggs avenue and North Tenth street, Brooklyn, N. Y., will enlarge his shop this month. Mr. Moussette expects a heavy business with the opening of the fall trade.

C. H. Angus Company, of Albany, N. Y., have sold the jobbing end of their business to Herman Liebich, Jr., and Frederick Mueller, who will conduct business under the firm name of the Albany Nickel Plating Works.

The New Era Lustre Company, of New Haven, Conn., announces that its dead black lacquer is a government standard. Besides dead black lacquer the New Era Lustre Company manufactures a series of high grade lacquers.

The receivership for the Hartford Foundry Company, Hartford, Conn., has been continued for another period of six months by order of the court. Receiver Charles E. Dustin has been authorized to spend $2,000 for additional machinery.

Powdered charcoal for brass founders, ground from solid wood and bolted through silk mesh—absolutely pure—is one of the products of Frederic B. Stevens, Detroit, Mich., a manufacturer and dealer of founders', finishers' and platers' supplies.

Elmore and Dwight Clark, of Plainville, Conn., have organized what is known as the National Metal Fabric Company, with headquarters in New York, for the manufacture of a metal fabric which is similar to the expanded metal now on the market.

The Coe Brass Manufacturing Company, of Torrington, Conn., is to build a big machine shop on the land now partly occupied by the gate house, which is being temporarily removed. Later on all of the employees at the gate house will occupy quarters in the main office.

The Standard Metal Company have been incorporated at Indianapolis, Ind., with $100,000, to conduct a jobbing business in tin plate and metals. The officers of the company are: President Wm. L. Elder; vice-president, Wm. M. Husbands; secretary-treasurer, F. A. Wilkening.

The G. W. J. Murphy Company, of Merrimac, Mass., manufacturers of polished brass, consisting of door handles, curtain fixtures and brass and silver filled mouldings, has been incorporated with a capital of $25,000, G. W. J. Murphy, president, Edward N. Cummings, treasurer.

A Steele-Harvey tilting furnace made by the Monarch Engineering & Mfg. Company, of Baltimore, Md., has been installed in the new Fairfield Aluminum Foundry at Southport, Conn. John Krader and Henry Reubel Company, of Brooklyn, N. Y., have placed recently an order for one of these furnaces.

The Aldrich-Murphy Company, of Winchester, Conn., have filed a certificate of incorporation which allows them to incorporate at any time. The authorized capital stock is $9,000, all paid in. Carl G. Aldrich, Louis B. Murphy and Bessie E. Aldrich, all of Winsted, are named as the intending incorporators.

E. A. Williams & Son, of Jersey City, N. J., which was established in 1857, have recently incorporated their business under the name of E. A. Williams & Son, with Thomas H. Williams president; Chas. C. Williams, vice-president; Thomas Hilton Williams, Jr., treasurer, and George R. Colyer, secretary.

The Edro Richardson Brass Company, of Baltimore, Md., has been incorporated with a capital of $20,000, to take over the business founded ten years ago by Edro Richardson for the manufacture of high grade castings of brass, copper, bronze and aluminum. It is anticipated to extend the business as opportunity offers.

The Andrews Pressed Metal Manufacturing Company, of Elgin, Ill., are to put up a new building 50x100 for the production of reservoir lawn vases, pressed metalware and general job work. The building will be equipped with a line of Bliss presses. Other cities desire to secure the company's new plant, but it is probable that they will remain at Elgin.

Collins & Wright, of Pittsburg, Pa., have purchased land at Butler and Fifty-fifth street upon which they will erect a new factory for the manufacture of metal trimmings for table glassware. Their line embraces salt and pepper tops, molasses jug tops, and other articles used in connection with glassware. Their new plant will give them greatly increased facilities.

The new brass foundry of the General Electric Company at Schenectady, N. Y., has been completed and was opened with the ceremony of having two of the molders, Thomas Thornton and Charles Warner, make the first castings. The new foundry will employ 100 molders and is one of the most modern and up-to-date in the country.

The New York branch of the Russell & Erwin Mfg. Company has been incorporated as the Russell & Erwin Mfg. Company of New York. This was done to accomplish better and more satisfactory results in various ways, and has been supplemented by numerous changes in the organization, which practically reorganizes the different departments and greatly increases their efficiency.

G. B. Buzzell, formerly with the Boston Art Metal Company, has started a large brass foundry at 262 Dover street, Boston, Mass. It will be known as the Robbins, Buzzell & Corcoran Brass Foundry Company. The main business will be the manufacture of a new patented hose coupling. Wm. T. Nicholson, of Cutter, Wood & Stevens Company, Boston, Mass., supplied the equipment.

The works of the Eagle Brass Foundry, Seattle, Wash., were totally destroyed by fire July 12, the damage being $10,000. The loss has been adjusted and plans have been finished for a new concrete and brick building which will be started immediately. This will more than double the capacity. In the meantime the company have secured temporary quarters and are taking care of their orders.

Owing to the steady increase in the demand for their "Golden Rod" brand of spelter H. M. Shimer & Co., of 19th street and Washington avenue, Philadelphia, Pa., have been compelled to double their capacity by an addition to their works. This spelter is used for high grade brass and bronze work, cartridge metal, etc.; the company also makes a high grade brazing spelter for brazing brass tubing and steel.

The Standard Sewing Machine Company, of Cleveland, Ohio, report that everything is off in the nature of a settlement with their former metal polishers and brass workers with whom they had a strike, but that they are now running in better shape than they ever were before. Both sides were about to submit their differences to outsiders, but on account of the obstacles it was thought best to cease negotiations.

Two metal manufacturing corporations have recently filed certificates of incorporation at Hartford, Conn. One of them is the H. C. Hart Manufacturing Company, of Farmington, which will make hardware, cutlery and silver plated ware. Capital stock $25,000. The other is the Turner & Stanton Company, capital stock $20,000, which has bought the factory occupied by the Thames Arms Company at Norwich.

The Fahrig metal made by Hurd & Haggin, of 316-322 Hudson street, New York, is an anti-friction metal that the makers say has been used quite largely during the past 5 years in crank pin bearings on steam vessels on the Lakes. It has also been used extensively in the East. The composition of Fahrig metal is stated to be mainly of tin and copper, although other metals are used. Neither lead, zinc nor antimony is used in the mixture.

The Waterbury Farrel Foundry & Machine Company, of Waterbury, Conn., has increased its capital stock from $400,000 to $440,000. With the new stock the company bought all of the stock of the Waterbury Machine Company that they did not already own, exchanging their own shares for the balance of the Waterbury Machine Company's stock. There will be no change in the organization or management of either company.

The Bates & Peard Patent Annealing Furnace Company, of Liverpool, England, are pleased with an order they have received recently for three furnaces from the manufacturing cartridge firm of The Kynochs, at Birmingham, England. C. M. Dally, the company's New York agent, with offices at 29 Broadway, believes that this means that other important cartridge manufacturing companies in England will necessarily have to equip their plants with the Bates & Peard labor saving annealing furnaces.

The Chandelier & Art Brass Works, of Richmond, Ind., have received the contract for all the lighting fixtures for the new temple to be erected by the Knights of Pythias at Indianapolis. The company had previously visited the building and had its designers make up special designs for each particular place in the building. These plans were not only elegant, but carried out the architectural features of the building so well that the contract for all the lighting fixtures was awarded to the company without hesitation.

The Joseph Dixon Crucible Company, of Jersey City, N. J., have issued a pamphlet describing their dynamo and motor graphite brushes. In 1900 the company had trouble with the carbon brushes on a generator they had, and the experiments then made resulted in the graphite brush mentioned in the pamphlet. Their three large generators and all their motors, about 100, are equipped with these brushes and there is never any trouble. The brushes have found favor throughout the United States and Europe.

The J. H. White Company, formerly at 127-137 North Tenth street, Brooklyn, have moved their office to 111 North Third street. They have recently fitted up a new factory at North Third and Berry streets, where they have over 100,000 square feet of floor space. With the larger amount of space and with additional tools and automatic machinery, together with the tools, machinery and patterns they recently purchased from the E. P. Gleason Manufacturing Company, they expect to be able to make prompt shipments of their large line.

The Blake & Johnson Company, Waterbury, Conn., manufacturers of special rivets, screws, nuts and bent and threaded wires of all metals, also builders of special metal working machinery have purchased about ten acres of land in the village of Waterville, a suburb of Waterbury. Both lines of business have outgrown their present quarters. The company intend to consolidate both plants upon this new tract of land as soon as it is possible to lay suitable plans, and they will have a thoroughly modern, up-to-date plant in every particular.

The International Silver Company, of Meriden, Conn., have acquired another factory by their recent purchase of the Rowley Silver Company, of Philadelphia, Pa., manufacturers of nickel-silver hotel ware. The machinery and equipment will be installed as a part of the nickel-silver department of the International Silver Company at Meriden. The Rowley Company have employed 100 hands. The International Company are making repairs to the building recently occupied by the Bergen Cut Glass Company, of Meriden, which they will now use for the accommodation of their sterling department.

The Crescent Brass Manufacturing Company, Seventh, Spruce and Bingham streets, Reading, Pa., have just installed a "Steele-Harvey" crucible furnace which is manufactured by the Monarch Engineering and Manufacturing Company, of Baltimore, Md., and which has enabled the Crescent company to take on additionl molders. The company are doing considerable business in specially designed monograms for automobiles. They also make a specialty of automobile castings, rolling mill bearings, and in fact everything that comes along in the line of jobbing foundry work in brass, bronze, aluminum and copper. They are running to their full capacity.

The expert German silver caster and roller Thomas Clare, of Taunton, Mass., has taken charge of the Allen Foundry, No. 20 Jennie Lind street of that city and in connection with Thomas Allen, a son of the founder, is to run the foundry, making a specialty of German silver castings, sterling silver castings, bronze dies, molds and fine work generally. The Allen Foundry

had a reputation throughout the country for its work in German silvers and castings, but was closed on account of the death of the senior Allen. The son has had such a number of inquiries for German silver and fine castings within the last few years that he decided to re-open the foundry.

Early this year the Tumney Copper & Bronze Company was organized by P. F. J. Tummey, who had sold out all his interest in the Cleveland Bronze & Brass Works, which business he founded in 1892. The new plant is located at 988-90-92 East Sixty-seventh street, Cleveland, O. One of the foundry buildings has been completed and will be devoted to general jobbing, a specialty being made of metals and castings that are intricate and difficult to cast, also castings for hydraulic cylinders. The company guarantees sound and perfect castings to stand the chemical analyses and physical tests that may be required by the specifications. All the buildings are expected to be finished by November 1.

The new building of the bronze foundry of Jno. Williams, Incorporated, at 556 West 27th street, New York City, is nearing completion. It is a six story structure 100 x 100 which is the third building of this size that the firm has erected and leaves the old-fashioned three-story building the only one which is not of the dimensions of the new ones. The new wing will contain a 500 H. P. engine which, with the old engine, will give them 800 H. P. This will operate the dynamos and compressed air plant. The new wing will also contain additional foundry room and probably a plating room. It is expected to be in operation in the fall. The entire plant is located not far from the center of New York and near the new station of the Pennsylvania Railroad.

## PRINTED MATTER

"The Silent Partner" is issued once a month by the Globe Machine & Stamping Company, of Cleveland, O.; it is worth reading, send for one.

The Syracuse Smelting Works, 36th street and 10th avenue, New York, are sending to the trade souvenir lead pencils calling attention to their manganese brand of anti-friction metal.

We have received from the National Supply Company, of Baltimore, Md., a catalogue of their furniture casters, hardware specialties and brass goods. All of the lines are large and varied.

The Uco Brass Manufacturing Company, 2436 Brown street, Philadelphia, Pa., have brought out a new stop and waste cock. It is made of good red metal, is simple in construction and has no springs.

"The Allan Metal" is the title of a new catalogue by A. Allan & Son, 486 Greenwich street, New York. It mentions some of the many uses to which this metal has been put, such as engine bearings, and bearings for dynamos, motors, steam turbines, etc.

A circular by Wm. H. Bristol, 41 Dey street, New York, describes his new electric pyrometer. This instrument is adapted for general use where control of the temperature is important. The pyrometers are made to indicate up to 600, 1,200, 2,000 and 2,500 degrees.

Bulletin A, issued by the Monarch Brass Company, of Cleveland, O., describes and illustrates several specimens of their high grade brass work for plumbers' use, such as stop and waste cocks, compression stops, fuller bibs, basin cocks, both for high and low compression work.

Two pamphlets have been received from the Osborn Mfg. Company, Cleveland, O., describing their "Economy" wheel brushes. Their wire wheel brushes are applicable in every factory where metal articles are made. Their hair and bristle brushes are all set in vulcanized rubber and all are sold with a guarantee that the bristles will not shed.

"Sandcraft" is the title of a booklet of notes on connecting and operating the injector sand blast apparatus built by C. Drucklieb, 132 Reade street, New York. In this sand blast the air supply is subdivided and applied at such points and in such manner that its effort is cumulative, producing a very vigorous blast of sand and air, so thoroughly mixed that each grain of sand may be considered as being projected upon the work individually and with the greatest obtainable velocity. This makes the apparatus exceedingly effective since the thoroughness of cleaning by means of the sand blast depends upon the force of the impact of the individual grains of sand.

The general catalogue, No. 40, of the Obermayer Company, of Cincinnati, Chicago and Pittsburg, is a publication of 370 pages, 6 x 9 inches, well bound in a strong cover. The book describes "everything you need in the foundry," to use the expressive motto of the firm. Mention should be made of the founder of this firm and the brief biography of him that begins the book. His is the story of a one-man enterprise starting in a modest frame building and a 20-foot space. The business grew, the owner put up a new plant and outgrew it, made extensive additions and then his factory went up in flames. Another plant on a six-acre site was planned, and in less than half a year the new works with six times the old capacity was in full operation. Buildings have been added and branches opened at home and in other cities, and the story of progress is a bright and instructive one. Every foundryman is interested in a volume of this kind and should write for a copy. The index alone occupies a space of over eleven pages.

## CATALOGUE BUREAU

Trade Getting Trade Literature. That is just the kind that is produced by THE METAL INDUSTRY Catalogue Department. Our output is neat and attractive, and correct in every detail. During the hot months of summer, when you do not feel like working, let us work for you. We can make you a catalogue that will be ready to bring trade when the Indian Summer days are with us again.

## ASSOCIATIONS AND SOCIETIES

Since July 1, 1906, the metallurgical society and establishment owned by S. Giovani in Teduccio, Italy, has become part of the Metallurgical Society "Giacomo Corradini" at Naples. Mr. Corradini will enlarge the establishment and give the society more scope. B. F. Moresco is president and Mr. Corradini the administrator.

The brass manufacturers of the United States following their usual custom as well as their understanding with the various trades and supply associations, will make whatever alterations, corrections or additions to their lists on the first of the year, and invite any suggestions from either the jobbers or manufacturers, that they may have to make, which should be sent to Wm. M. Webster, suite 1110-1112 Schiller Bldg., Chicago, Ill., to place in the hands of the list committee, which meets early in September.

## INCORPORATIONS

The Allyne Brass Foundry Co., of Detroit, Mich., has increased its capital from $25,000 to $50,000.

The Northwestern Pipe & Supply Company, Erie, Pa., has been incorporated. The new company will make a general mill supply line.

The P R Manufacturing Company, of Detroit, Mich., has been incorporated to manufacture electric bells, trunk trimmings, electrical and hardware specialties.

The Piqua (O.) Brass & Fixture Company has been incorporated. The officers are: L. C. Covault, president; James Ward Keyt, vice-president; Willis Slauson, secretary-treasurer; and Adolph Weller, superintendent.

The Chandelier & Art Brass Works, of Richmond, Ind., have increased their capital to $100,000. The business has been growing so rapidly, particularly in the chandelier and galvanized steel

step ladder departments, that they were compelled to increase their facilities.

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The Sterling Brass Works, of Chicago, Ill., have been incorporated under the laws of the State of Illinois, capital stock $20,000, for the purpose of manufacturing and selling brass goods. The incorporators are Charles P. Burbach, John S. Hunter and Fred. Van Voorst.

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The Silverease Company have been incorporated in the State of Massachusetts with a capital of $50,000 to manufacture cleaning and polishing substances, particularly a silver cleaner. The officers of the company are: President, George G. Norris, 220 Porter street, Melrose, Mass.; treasurer, Edwin M. Randolph, 65 Staunton street, Dorchester, Mass.

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The Frank Fabian Manufacturing Company, of St. Paul, Minn., has filed articles of incorporation with the secretary of the State with a capital of $200,000. F. A. Fabian, Sophia Fabian and Charles Rose are the incorporators, and the company intend to manufacture a full line of oil cans, pieced tin ware, etc., and japanned ware. At present they are making a number of specialties and employ thirty men.

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J. W. Beach, founder of the metal firm of that name of Bridgeport, Conn., died on July 2 and the business has since been incorporated under the title of The J. W. Beach Company under the laws of the State of Connecticut and with a capital stock of $30,000. The officers are Grace L. Beach, president; Russell D. Cate, secretary and treasurer. Mr. Cate has been manager of the business for some time and will continue as the active head.

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The following concerns have filed application for incorporation in their respective States:

The E. F. White Brass Company, of Stamford, Conn., has filed a certificate of incorporation with a capital stock of $10,000. The stockholders are: E. F. White, R. A. Allison and Samuel Allison. Fine bronze work will be a specialty.

Norwich Nickel & Brass Company, Hartford, Conn.; from $45,000 to $80,000.

Woonsocket Supply Company, 243 Main street, Woonsocket, R. I., hardware and electrical goods. Frank E. Holden, president.

Rex Manufacturing Company, Hoboken, N. J., brass and other metals; $100,000. Wm. F. Midlege, W. A. Harland, M. C. Jenkins.

Owen Bros. Hillson Company, Boston, Mass., dealers in aluminum specialties; $50,000. President, F. M. Owens, 19 Washington street.

Memphis Plating Company of Memphis, Tenn., changed to Memphis Plumbing and Plating Company, and increase capital from $5,000 to $10,000.

The Wells Chemical Bronze Works, of Worcester, Mass., has been incorporated with Thomas A. Callahan president, and Frank C. Harrington, treasurer. The new company will make a specialty of brass and bronze castings.

The Harry E. Campbell Company, Albany, N. Y., to manufacture and erect architectural and structural iron, steel, brass, bronze and other metal work; capital, $10,000. Stockholders, Harry Campbell, Wm. H. Stuart, Ogley Roberts, Julius D. Ireland, Geo. H. Gisat, all of Albany, and Anson G. Illch, of New York City.

## PERSONALS

G. B. Buzzell has resigned as foreman of the Boston Art Metal Company to go into business for himself, as noted in our Trade News.

R. D. Foster, who has been secretary of the Hanson & Van Winkle Company for a number of years, will be made treasurer, taking the place of Frederick S. Ward, who died on July 13th.

## DEATHS

The Tilghman-Brooksbank Sand Blast Company of Philadelphia, Pa., have recently lost two members of the company, their managing director J. E. Matthewson, who died at Broadheath, England, and the secretary and treasurer of their American branch of the company, R. Tilgham, having died in the United States.

Robert B. Shimer, father-in-law of C. K. Sanborn, vice-president of the Haydenville Company, of 150 Nassau street, New York, manufacturers of plumbing and steam brass and iron goods, lost his life by being struck by a passenger train on the Erie Railroad at Ridgewood, N. J., July 14. He was a commission merchant in New York and was waiting for his morning train. He was 65 years of age.

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George J. Laighton, former president of the Russell & Erwin Mfg. Company, died July 1, at Asheville, N. C. Mr. Laighton was born in Portsmouth, N. H., where he worked two years in a retail hardware store. He then started for New York with a letter of recommendation from his late employers, with the intention of obtaining work with Russell & Erwin. In this he succeeded, and not long afterward was transferred to the California branch of the business. In the new location he was first clerk, then buyer and finally manager, and under his direction the business grew to $700,000 a year before the department was discontinued. He was made a director of the company in 1891; assistant treasurer two years later; treasurer in 1895; vice-president in 1896, and president in 1898. On his retirement from active business in 1903 he was presented with a sterling silver loving cup, the gift of the selling staff, as an expression of their appreciation of his many sterling qualities of character.

## METAL MARKET REVIEW

New York, August 6, 1906.

COPPER.—The prices for standard warrants in the London market during the early part of the month declined about £3 per ton on reports from this side of an easier copper market, with prices a shade lower. Spot warrants opened at £81 10s. and declined to £78 2s. 6d., the lowest point on the 13th. Prices then steadily advanced on heavy trading to £84 and closed steady at £82 10s.

The easier tone noted in the New York copper market about a month ago was more sentimental than real, and although prices were marked down on the Metal Exchange, there was really no decline during the month and consequently no advances. The market was very dull and quiet for about two weeks. Consumers held off and advantage was taken of the general dulness to try and depress prices, and for a time lower prices were given out and copper in limited quantities was offered at about ¼ cent below the actual market, when Europe began buying and home consumers started to place contracts, the real condition of the copper market had not been affected and consumers and exporters had to pay full prices to get the copper. There has been a very large business done both for home consumption and for export, and the market is apparently as strong as ever it was. The brass rolling mills and wire mills are all full of orders and with general confidence once more established, as we have seen it lately in pig iron and steel, the market looks good for the end of the year. The exports for July will total about 19,000 tons, or about the same as last July, so that we are still about 29,000 tons behind our exports of last year. The copper market closes strong: Lake, 18¾, Electrolytic, 18½ and prime casting brands, 18¼ to ⅜.

TIN.—It has been quite impossible to account for the ups and downs of the London market. Spot tin opened at £177 10s., advanced to £179 5s. on the 3rd, then declined to £164 10s. on the 12th, and closed at £170 12s. 6d. The net result has been to leave London about £7 per ton lower than a month ago.

The New York market has simply followed the vagaries of the London speculators. With no pronounced trading operator in this market we are more or less controlled by foreign houses with stocks of tin held in this market for their account. Consumption for the month is put down at 3,100 tons, and the total shipments from the Straits for the month of July are 4,136 tons, so that statistically the market is as strong as ever, and with a good fall business well developed in all other metals, we are likely to have to pay higher for our tin. The market closes five-ton lots spot, 37.50; five to ten-ton lots, August-September shipment, 37.35; one-ton lots 15 points higher.

Later.—Tin market very active and excited with price of tin about 40¼ cents per pound. This sudden advance has been entirely operated from London.

LEAD.—The foreign lead market has changed very slightly;

opened at £16 13s. 9d., fluctuated about 6s., and closed at £16 13s. 9d.

There has been no change by the lead trust, the foreign market just kept above the import price. The trust price is 5.75, New York shipment, and spot carloads are about 5.77½ to 5.80.

SPELTER.—London opened at £27 and closed at £26 10s.

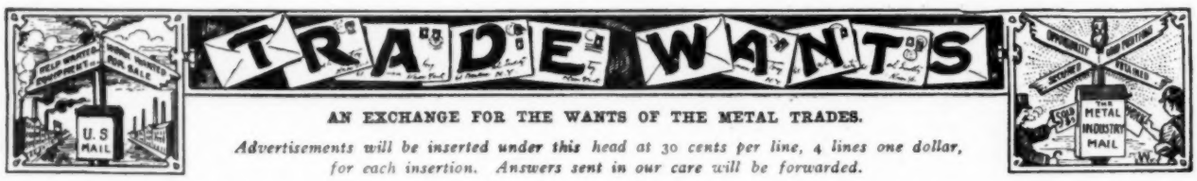
The New York market is steady, there has been a little more business reported during the month, consumers have come in more freely and the demand has been quite active. In East St. Louis price holds at 5.92½ cents and shipment to New York is quoted at 6.05 to 6.10 cents, carload lots.

ALUMINUM.—The price for ingot aluminum has been advanced one cent per pound, the present quotations being 36 to 39 cents, according to quantity. The price for sheet aluminum has been advanced from one cent to five cents per pound and there has been an increase of three cents per pound in the price list for aluminum rod and wire. The reason given for the advance is the great demand for metal, which is in excess of the supply. At the same time the manufacturers say they expect to be in a position shortly to take care of the market.

ANTIMONY.—The London market after opening at £112 for Halletts advanced to £115 on July 4 and later declined to £102, the price to-day.

In the New York market stocks are more or less limited and the market has been held very firm. Cooksons to-day is held at 24.75 to 25 cents, Halletts 23.75 to 24 cents, Hungarian and French 22 to 22½ cents. There is no Japanese on spot.

OLD METALS.—With the firmer tone and activity in copper and nearly all other metals the scrap market has been very active and prices have, in several instances, been marked up. The demand from the mills has been good and the general outlook is in better shape than for some time past. Copper scrap, composition and marz brass have been in demand and stocks were light so that good prices have been realized. Zinc slab dross holds firm at about 4.75 to 4.80 cents, new York. Foreign market too low, the parity being about 4.65 cents.




**AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.**

*Advertisements will be inserted under this head at 30 cents per line, 4 lines one dollar, for each insertion. Answers sent in our care will be forwarded.*

## FOR SALE

FOR SALE—Two EZRA SAWYER MAGNETIC METAL SEPARATORS, in good condition. Address SAWYER, care THE METAL INDUSTRY.

FOR SALE—No. 1 H. & V. W. Plating Dynamo in first class order for less than half cost. Also one speed lathe (new) with hand feed slide rest. Address DYNAMO, care THE METAL INDUSTRY.

FOR SALE—PROCESS OF BLACK OXIDATION of Iron and Steel. A method of rapidly oxidizing iron and steel in durable deep black color. For further particulars address HENRI RYCHNER, ZURICH III, SWITZERLAND.

FOR SALE—5 to 10 tons prime remelted SPELTER; also 5,000 pounds TERNE METAL. Quotations upon application. Address P. McLAUGHLIN'S SONS COMPANY, 230-236 North Twelfth street, Brooklyn, N. Y.

FOR SALE—German Silver Scrap, mostly in the form of sheets, viz.:

14,710 lbs. 10 per cent.;
8,000 lbs. 16 per cent.;
6,339 lbs. 18 per cent. Good clean scrap. Address stating price offered, GERMAN SILVER SCRAP, care THE METAL INDUSTRY.

## SITUATIONS OPEN

WANTED—Two (2) first-class BRASS MOLDERS familiar with plumbing supply work. Address UNION METAL WORKS, 80 Carter street, Chelsea, Mass.

WANTED—ENERGETIC BUSINESS MAN with capital to finance hardware manufacturing plant near San Francisco, Cal. A1 proposition. Address MR. E. R. S., Richmond P. O., Cal.

WANTED—A FIRST CLASS PLATER who has had experience in handling antimonial metal in all finishes, Ormulo gold in particular. Address ORMULO GOLD, care THE METAL INDUSTRY.

WANTED—A Pompeian or Acid Green FINISHER on gas portable work made from brass and plated metal. Address PORTABLE, care THE METAL INDUSTRY, 61 Beekman street, New York City.

WANTED—FOREMAN MOLDER—For brass foundry making twenty-five to fifty tons castings per month. Mostly heavy work. Young man desired. Located in Western Pennsylvania. Address WESTERN, care THE METAL INDUSTRY.

WANTED—CLOSE PLATER in city 600,000 inhabitants, must be able to do all kinds of work, and be sober and energetic. State experience and salary, also age and whether married or single. Address CLOSE PLATER, care THE METAL INDUSTRY.

## SITUATIONS OPEN—Continued

WANTED—A superintendent for a factory at Lancaster, Pa., manufacturing toilet sets from German silver and Britannia metals and other silver plated novelties and umbrella handles. Reference required. Address the LANCASTER SILVER PLATING CO., Lancaster, Pa.

WANTED—FOREMAN FOR FOUNDRY on small brass castings. Address, stating experience and salary expected, CASTINGS, care of THE METAL INDUSTRY.

## SITUATIONS WANTED

SITUATION WANTED—Plater of 22 years' experience in a variety of lines. Now working on over fifty different finishes. Good references. Can accept position in one week's notice. Address REFERENCE, care THE METAL INDUSTRY.

## MISCELLANEOUS WANTS

We have little need of a laboratory. To help pay our chemist will accept brass, white metals and drosses. Cheap. TAZEWELL WHITE LIME WORKS, North Tazewell, Virginia.

CASH PAID for old precious metals and minerals in any form. Gas mantle dust, bronze powder, bismuth, platinum, mercury, nickel, etc. Address JOSEF RADNAI, 32 Fulton street, New York City.

WANTED—In good order DING'S ELECTRO MAGNETIC SEPARATOR for a Sawyer or Burlin metal separator for immediate shipment. Price must be low for spot cash. Address or call on ILLINOIS SMELTING & REFINING COMPANY, 122 N. Peoria street, Chicago, Ill.

ANNOUNCEMENT.—We have come into possession of one of the finest equipments in the country for the production of casket hardware and can offer handles and plates at very reasonable prices. PROVIDENCE SILVER PLATE COMPANY, 677 CRANSTON ST., PROVIDENCE. R. I.

## INFORMATION BUREAU

Subscribers intending to purchase metals, machinery and supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Our Information Bureau is for the purpose of answering questions of all kinds. Send for circular.

## OFFICE HEADQUARTERS

When visiting New York, the out-of-town friends of THE METAL INDUSTRY are invited to make our office their headquarters, where a writing desk and telephone service will be at their disposal. Every one interested in the non-ferrous metals and alloys is invited to call.

# Metal Prices, August 6, 1906

| METALS. | Price per lb. |
|---|---|
| COPPER, PIG, BAR AND INGOT AND OLD COPPER | |
| Duty Free. Manufactured 2½c. per lb. | |
| Lake, car load lots | 18.75 |
| Electrolytic, car load lots | 18.50 |
| Casting, car load lots | 18.25 |
| TIN—Duty Free. | |
| Straits of Malacca, car load lots | 40.25 |
| LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb. | |
| Pig Lead, car load lots | 5.80 |
| SPELTER—Duty 1½c. per lb. | |
| Western car load lots | 6.10 |
| ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb. | |
| Small lots | 39.00 |
| 100 lb lots | 37.00 |
| Ton lots | 36.00 |
| ANTIMONY—Duty ¾c. per lb. | |
| Cooksons, cask lots | 24.75 |
| Hallets, cask lots | 24.00 |
| Other, cask lots | 23.00 |
| NICKEL—Duty 6c. per lb. | |
| Large lots | .45 to .50 |
| Small lots | .50 to .65 |
| MANGANESE—Duty 20% | .70 |
| MAGNESIUM—Duty Free | $1.50 to $1.60 |
| BISMUTH—Duty Free | 1.60 to 1.70 |
| CADMIUM—Duty Free | 1.50 to 1.60 |
| | Price per oz. |
| GOLD—Duty Free | $20.67 |
| SILVER—Duty Free | .64¾ |
| PLATINUM—Duty Free | 26.00 |
| QUICKSILVER—Duty 7c. per lb. Price per Flask | 41.00 |

| OLD METALS. | | Price per lb. |
|---|---|---|
| Heavy Cut Copper | 16.50 | 17.00 |
| Copper Wire | 16.00 | 16.50 |
| Light Copper | 15.00 | 15.50 |
| Heavy Mach. Comp | 15.00 | 15.50 |
| Heavy Brass | 11.00 | 11.50 |
| Light Brass | 9.00 | 9.50 |
| No. 1 Yellow Brass Turnings | 10.00 | 11.00 |
| No. 1 Comp Turnings | 12.00 | 13.00 |
| Heavy Lead | 5.40 | 5.50 |
| Zinc Scrap | 4.50 | 5.00 |
| Scrap Aluminum, sheet, pure | 25.00 | 29.00 |
| Scrap Aluminum, cast, alloyed | 20.00 | 25.00 |
| Scrap Aluminum, turnings | 10.00 | 12.00 |
| Old Nickel | 15.00 | 25.00 |
| No. 1 Pewter | 26.00 | 27.00 |

| | Price per lb. |
|---|---|
| SILICON COPPER, according to quantity | .36 to .38 |
| PHOSPHOR COPPER, 5% | .24 to .26 |
| Phosphor Tin | .45 to .46 |
| Brass Ingot, Yellow | .13 to .14 |
| Brass Ingot, Red | .15 to .18 |
| Bronze Ingot | .15 to .17 |
| Manganese Bronze | .20 to .22 |
| Phosphor Bronze | .20 to .23 |

| ZINC—Duty, sheet, 2c. per lb. | Price per lb. |
|---|---|
| 600 lb. casks | 8.25 |
| Open casks | 8.75 |

| PHOSPHORUS—Duty 18c. per lb. | |
|---|---|
| According to quantity | .40 to .60 |

## PRICES OF SHEET COPPER.

| SIZES OF SHEETS. | | 96oz. & over 75 lb. sheet 30x60 and heavier | 64oz. to 96oz. 50 to 75 lb. sheet 30x60 | 32oz. to 64oz. 25 to 50 lb. sheet 30x60 | 24oz. to 32oz. 18¾ to 25 lb. sheet 30x60 | 16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60 | 14oz. and 15oz. 11 to 12½ lb. sheet 30x60 |
|---|---|---|---|---|---|---|---|
| | | CENTS PER POUND. | | | | | |
| Not wider than 30 ins. | Not longer than 72 ins. | 23 | 23 | 23 | 23 | 23 | 24 |
| | Longer than 72 ins. Not longer than 96 ins. | 23 | 23 | 23 | 23 | 23 | 24 |
| | Longer than 96 ins. | 23 | 23 | 23 | 24 | 23 | 25 |
| Wider than 30 ins. but not wider than 36 ins. | Not longer than 72 ins. | 23 | 23 | 23 | 23 | 23 | 25 |
| | Longer than 72 ins. Not longer than 96 ins. | 23 | 23 | 23 | 23 | 23 | 25 |
| | Longer than 96 ins. Not longer than 120 ins. | 23 | 23 | 23 | 23 | 24 | 26 |
| | Longer than 120 ins. | 23 | 23 | 23 | 24 | 25 | |
| Wider than 36 ins. but not wider than 48 ins. | Not longer than 72 ins. | 23 | 23 | 23 | 24 | 25 | 27 |
| | Longer than 72 ins. Not longer than 96 ins. | 23 | 23 | 23 | 24 | 26 | 28 |
| | Longer than 96 ins. Not longer than 120 ins. | 23 | 23 | 23 | 25 | 27 | 31 |
| | Longer than 120 ins. | 23 | 23 | 24 | 26 | 29 | |
| Wider than 48 ins. but not wider than 60 ins. | Not longer than 72 ins. | 23 | 23 | 23 | 24 | 26 | 29 |
| | Longer than 72 ins. Not longer than 96 ins. | 23 | 23 | 23 | 25 | 27 | 32 |
| | Longer than 96 ins. Not longer than 120 ins. | 23 | 23 | 24 | 26 | 29 | |
| | Longer than 120 ins. | 24 | 24 | 25 | 27 | 31 | |
| Wider than 60 ins. but not wider than 72 ins. | Not longer than 96 ins. | 23 | 23 | 24 | 26 | 31 | |
| | Longer than 96 ins. Not longer than 120 ins. | 23 | 23 | 25 | 28 | 33 | |
| | Longer than 120 ins. | 24 | 24 | 26 | 31 | | |
| Wider than 72 ins. but not wider than 108 ins. | Not longer than 96 ins. | 24 | 24 | 26 | 29 | | |
| | Longer than 96 ins. Not longer than 120 ins. | 25 | 25 | 27 | 30 | | |
| | Longer than 120 ins. | 26 | 26 | 28 | 32 | | |
| Wider than 108 ins. | Not longer than 132 ins. | 27 | 27 | 29 | | | |
| | Longer than 132 ins. | 28 | 28 | 31 | | | |

Rolled Round Copper, ⅝ inch diameter or over, 23 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 3½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

# Metal Prices, August 6, 1906

Net Cash Prices.

## COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb.....27c.
12 oz. and up to 14 oz. to square foot, per lb.....28c.
10 oz. and up to 12 oz.....30c.
Lighter than 10 oz.....33c.
Circle less than 8 in. diam., 2c. per lb. additional.
Circles over 13 in. diam. are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

## PRICE LIST FOR ROLL AND SHEET BRASS.

Prices are for 100 lbs. or more of Sheet Metal in one order.

Brown & Sharpe's Gauge the Standard.

| Common High Brass | in. | in. | in. | in. | in. | in. | in. | in. | in. | in. |
|---|---|---|---|---|---|---|---|---|---|---|
| Wider than and including | 2 12 | 12 14 | 14 16 | 16 18 | 18 20 | 20 22 | 22 24 | 24 26 | 26 28 | 28 30 |
| To No. 20 inclusive.. | .22 | .23 | .25 | .27 | .29 | .31 | .33 | .36 | .39 | .42 |
| Nos. 21, 22, 23 and 24 | .22 | .24 | .26 | .28 | .30 | .32 | .34 | .37 | .40 | .43 |
| Nos. 25 and 26..... | .23 | .24½ | .27 | .29 | .31 | .33 | .35 | .38 | .41 | .44 |
| Nos. 27 and 28..... | .23 | .25 | .28 | .30 | .32 | .34 | .36 | .39 | .42 | .45 |

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from list 17½ per cent for orders of over 5,000 lbs. per year. For orders of less than 5,000 lbs. per year, 12½ per cent.

## PRICE LIST FOR BRASS AND COPPER WIRE.

| BROWN & SHARPE'S GAUGE THE STANDARD. | Com. High Brass. | Low Brass. | Gilding Bronze and Copper. |
|---|---|---|---|
| All Nos. to No. 10, Inc..... | $0.23 | $0.27 | $0.28 |
| Above No. 10 to No. 16..... | .23½ | .27½ | .28½ |
| Nos. 17 and 18..... | .24 | .28 | .32 |
| " 19 and 20..... | .25 | .29 | .33 |
| No. 21..... | .26 | .30 | .34 |
| " 22..... | .27 | .31 | .35 |
| " 23..... | .28 | .32 | .36 |
| " 24..... | .30 | .34 | .38 |

Discount from list 15 and 2½ per cent for orders of over 5,000 lbs. per year. For orders of less than 5,000 lbs. per year, discount 12½ per cent.

## PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ in. to 3½ in. O. D. Nos. 4 to 13 Stubs Gauge, 22c. per lb.
Seamless Copper Tubing, 25c. per lb.

For other sizes see Manufacturers' List.

## PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

| Iron Pipe size. | ⅛ | ¼ | ⅜ | ½ | ¾ | 1 | 1¼ | 1½ | 2 | 2½ | 3 | 3½ | 4 | 4½ | 5 | 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Price per lb.. | 30 | 29 | 24 | 23 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 23 | 24 | 26 | 28 | 29 |

## BRAZED BRASS TUBING.

Brown & Sharpe's Gauge the Standard.

| | | | | | | Per lb. |
|---|---|---|---|---|---|---|
| Plain Round Tube, | ¾ | in. up to | 2 | in., to No. 19, inc. | | $0.35 |
| " " " | ⅞ | " " | 2½ | " " 19, " | | .36 |
| " " " | 1 | " " | 2⅝ | " " 19, " | | .38 |
| " " " | 1⅛ | " " | 3 | " " 19, " | | .41 |
| " " " | 1¼ | " " | 3⅛ | " " 19, " | | .48 |
| " " " | 1⅜ | " " | 3½ | " " 19, " | | .65 |
| " " " | 1½ | " " | 3⅝ | " " 19, " | | 1.00 |
| " " " | 1⅝ | " " | 3¾ | " " 19, " | | 1.50 |
| Smaller than ⅛ inch | | | | | | Special |
| 2 inch to 3 inch, to No. 19, inclusive | | | | | | .38 |
| 3 inch | | | | | | .40 |
| Over 3 inch to 3½ inch | | | | | | .45 |
| Over 3½ inch | | | | | | .50 |

Bronze and copper advance 3 cents. Discount from list 25 and 5 per cent for orders of over 5,000 lbs. per year. For orders of less than 5,000 lbs. per year, discount 25 per cent.

## PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

| Wider than and .. including .. | *3in. 12in. in coils. | 6in. 14in. | 14in. 16in. | 16in. 18in. | 18in. 20in. | 20in. 24in. | 24in. 30in. | 30in. 36in. | 36in. 40in. | Polishing or Cutting to Length. | Satin Finishing on One Side. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W. 13 and heavier.. | 45 | 45 | 47 | 47 | 47 | 47 | 50 | 50 | 50 | 1 | 2 |
| " 14..... | 45 | 45 | 47 | 47 | 47 | 47 | 50 | 50 | 50 | 1 | 2 |
| " 15..... | 45 | 45 | 47 | 47 | 47 | 47 | 50 | 50 | 50 | 1 | 2 |
| " 16..... | 45 | 45 | 47 | 47 | 47 | 47 | 50 | 50 | 50 | 1 | 2 |
| " 17..... | 45 | 45 | 47 | 47 | 47 | 47 | 50 | 50 | 50 | 1 | 3 |
| " 18..... | 45 | 45 | 47 | 47 | 47 | 47 | 50 | 50 | 53 | 1 | 3 |
| " 19..... | 45 | 45 | 47 | 47 | 47 | 47 | 50 | 51 | 54 | 1 | 4 |
| " 20..... | 45 | 47 | 47 | 47 | 47 | 49 | 52 | 53 | 55 | 1 | 4 |
| " 21..... | 45 | 49 | 49 | 49 | 49 | 51 | 54 | 55 | 61 | 2 | 5 |
| " 22..... | 45 | 49 | 49 | 49 | 51 | 51 | 54 | 58 | 62 | 2 | 5 |
| " 23..... | 45 | 49 | 49 | 49 | 51 | 51 | 54 | 60 | 63 | 2 | 6 |
| " 24..... | 45 | 49 | 51 | 53 | 53 | 53 | 56 | 62 | 65 | 2 | 6 |
| " 25..... | 47 | 50 | 52 | 54 | 54 | 54 | 57 | 64 | 68 | 2 | 7 |
| " 26..... | 47 | 50 | 53 | 57 | 57 | 57 | 62 | 66 | 72 | 2 | 8 |
| " 27..... | 47 | 51 | 55 | 59 | 59 | 60 | 65 | 69 | 75 | 2 | 10 |
| " 28..... | 47 | 51 | 57 | 59 | 60 | 60 | 67 | 73 | 78 | 2 | 11 |
| " 29..... | 49 | 52 | 59 | 61 | 63 | 63 | 72 | 78 | 83 | 2 | 13 |
| " 30..... | 49 | 53 | 61 | 63 | 67 | 73 | 80 | 83 | 88 | 2 | 15 |
| " 31..... | 52 | 56 | 64 | 67 | 72 | 80 | 83 | 86 | 92 | 3 | 17 |
| " 32..... | 54 | 58 | 66 | 70 | 78 | 86 | 93 | 99 | 104 | 3 | 19 |
| " 33..... | 56 | 60 | 69 | 74 | 82 | 93 | 100 | 109 | 119 | 3 | 21 |
| " 34..... | 59 | 64 | 71 | 79 | 87 | 100 | 112 | 119 | 129 | 3 | 25 |
| " 35..... | .. | 74 | 79 | 89 | 99 | 109 | 124 | 134 | .. | .. | .. * |
| " 36..... | .. | 89 | 99 | 109 | 124 | 129 | 144 | .. | .. | .. | .. |
| " 37..... | .. | 107 | 117 | 132 | 147 | 162 | 177 | .. | .. | .. | .. |
| " 38..... | .. | 127 | 142 | 157 | 172 | 187 | 207 | .. | .. | .. | .. |
| " 39..... | .. | 147 | 167 | 187 | 207 | 227 | .. | .. | .. | .. | .. |
| " 40..... | .. | 177 | 207 | 227 | 247 | .. | .. | .. | .. | .. | .. |

*Polished or scratch brushed 2 sides, double above prices.

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

## PRICE LIST OF SEAMLESS ALUMINUM TUBING—STUBS' GAUGE.

| Stubs' G. | ¼" | ⅜" | ½" | ⅝" | ¾" | 1" | 1½" | 2" | 2½" | 2¾" |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 to 11.... | .. | .. | 96 | 86 | 83 | 77 | 67 | 61 | 61 | 61 |
| 12..... | .. | 1.08 | 96 | 86 | 83 | 77 | 67 | 61 | 61 | 61 |
| 13..... | .. | 1.08 | 96 | 86 | 83 | 77 | 67 | 64 | 64 | 64 |
| 14..... | .. | 1.08 | 96 | 86 | 83 | 77 | 67 | 64 | 64 | 64 |
| 15..... | .. | 1.12 | 96 | 89 | 86 | 80 | 70 | 67 | 67 | 67 |
| 16..... | .. | 1.15 | 99 | 93 | 89 | 83 | 70 | 70 | 70 | 70 |
| 17..... | .. | 1.18 | 1.02 | 96 | 93 | 86 | 73 | 73 | 73 | 73 |
| 18..... | 1.85 | 1.24 | 1.05 | 99 | 93 | 86 | 77 | 77 | 77 | 80 |
| 19..... | 1.88 | 1.28 | 1.08 | 1.02 | 99 | 93 | 83 | 80 | 80 | 83 |
| 20..... | 1.95 | 1.31 | 1.15 | 1.08 | 1.05 | 99 | 89 | 86 | 86 | 89 |
| 21..... | 2.01 | 1.37 | 1.21 | 1.15 | 1.12 | 1.05 | 99 | 93 | 93 | 96 |
| 22..... | 2.17 | 1.44 | 1.24 | 1.18 | 1.15 | 1.08 | 1.05 | 99 | 1.05 | 1.05 |
| 23..... | 2.33 | 1.50 | 1.31 | 1.24 | 1.21 | 1.15 | 1.15 | 1.08 | 1.15 | 1.15 |
| 24..... | 2.48 | 1.60 | 1.37 | 1.31 | 1.28 | 1.18 | 1.21 | 1.21 | 1.24 | .. |
| 25..... | 2.65 | 1.69 | 1.47 | 1.37 | 1.34 | 1.28 | 1.34 | .. | .. | .. |

Prices are for lots of 50 lbs. Boxing extra. Smaller, larger and intermediate sizes furnished by manufacturers.

## PRICE LIST FOR ALUMINUM ROD AND WIRE—B. & S. GAUGE.

| Diameter B. & S. G'ge. | 0000 to No. 10. | No. 11. | No. 12. | No. 13. | No. 14. | No. 15. | No. 16. | No. 17. | No. 18. | No. 19. | No. 20. | No. 21. | No. 22. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Price, per lb.... | 43 | 43½ | 43½ | 44 | 44½ | 45 | 45½ | 46 | 47 | 48 | 49 | 52 | 57 |

200 lbs. to 30,000 lbs., 8 cents off list; 30,000 lbs. and over, 4 cents off list.

## PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

| Per cent. | Price per lb. | Per cent. | Price per lb. |
|---|---|---|---|
| 12..... | $0.52 | 16..... | .58 |
| 13..... | .53 | 17..... | .59 |
| 14..... | .54 | 18..... | .60 |
| 15..... | .55 | | |

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 40 per cent.

Munts or Yellow Metal Sheathing (14" x 48") .....18c. lb. net base.
" " " Rectangular Sheets other than Sheathing ..... ..... .....20c. " " "
" " " Rod ..... .....19c. " " "
Tobin Bronze Rod..... ... .....21c. " " "
Above are for 100 lbs. or more in one order.